Washington Avenue (CR 503) – Carlstadt Borough
Road Safety Audit

FINAL REPORT

October 2013

Submitted by

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In cooperation with

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Bureau of Transportation Data Development
and
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Federal Highway Administration

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Supplementary Notes

Abstract
This report documents findings and recommendations made by the RSA team on April 12, 2013.

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CAIT's Transportation Safety Resource Center (TSRC) and New Jersey Local Technical Assistance Program (NJ LTAP) offer a statewide Road Safety Audit (RSA) service at no charge to New Jersey towns and counties. Interested parties can request road surveys conducted by a team of engineers, planners, and law-enforcement officers to help municipalities and counties make cost-effective safety improvements.

A multidisciplinary team of professionals offers assessments on roadway issues such as pedestrian and bicycle safety, intersection analyses, rural roads, human factors, speed management, and sign visibility and retro-reflectivity standards.

RSAs include data-driven considerations and analysis of crashes. To determine the best safety solutions, RSA professionals perform incisive crash data evaluations on the target area using Plan4Safety, TSRC's award-winning crash database and software.

The RSA team provides a final report that includes long- and short-term countermeasure recommendations that fit within the requestor's budget. Furthermore, RSAs pay off. According to the Federal Highway Administration (FHWA), countermeasures applied after RSAs can reduce crashes by approximately 60 percent.

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Introduction

The Rutgers' Transportation Safety Resource Center (TSRC) at the Rutgers' Center for Advanced Infrastructure and Transportation (CAIT) and the North Jersey Transportation Planning Authority (NJTPA) have partnered to provide NJTPA's sub-regions with facilitated Road Safety Audits at locations identified by the sub-regions as having safety concerns. To assist the sub-regions in making this determination, NJTPA and TSRC have prepared a ranking of roadway segments based on crash data.

In the FY 2013 application, Bergen County submitted a two-part, $1 million total proposal to the NJTPA Local Safety Program to install improvements along Washington Avenue, specifically:

- *Construction of concrete barrier curb connecting to the existing concrete barrier curb on Washington Avenue and NJ 120 including appropriate end treatments.*
- *Installation of pedestrian countdown traffic signal heads. All existing traffic signals have been warranted and approved by the NJDOT Bureau of Traffic Engineering and Safety.*
- *Construction of pedestrian curb ramps where required.*
- *Installation of detectable warning surfaces on new or existing pedestrian curb ramps.*
- *Construction of highly visible "international" crosswalks, also known as ladder or zebra crosswalks.*
- *Installation and replacement of regulatory, warning, and pedestrian signs.*
- *Installation of flashing pedestrian warning signs.*
- *Completion of guide rail end treatments upgrades*.

This proposed project was not selected in for the FY 2013 funding cycle of the NJTPA Local Safety Program; however, the review committee was supportive of improvements along Washington Avenue. The segment was a section of Bergen County's top-ranked corridor from the NJTPA crash prone location list 08-10 (CR 503–Washington Avenue 0.23-11.61). As such, NJTPA felt:

> A RSA would be best to get a better idea if the proposed improvements (primarily an extension of an existing concrete divider) is the appropriate countermeasure for the types of crashes that are occurring.

This section of roadway became a focus due to its immediate proximity to the Meadowlands Sporting Complex. Much of the general area is seeing infrastructure improvements in advance of the 2014 Super Bowl; however, there are no improvements planned along this section of Washington Avenue. Additionally, a pedestrian fatality occurred along the southerly section of the roadway in the vicinity of Road A since the time of the original application.

For the reasons above, Bergen County, NJTPA, and Rutgers' TSRC confirmed the location of the RSA to be Washington Avenue between Moonachie Boulevard/Empire Avenue and its southerly terminus at NJ 120.

Background

The audit focused on six intersections along the corridor of Washington Avenue, as shown in Figure 1 below, located within Carlstadt Borough, in Bergen County:

- Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)
- Commerce Boulevard & Washington Avenue (CR 503)
- Avenue A & Washington Avenue (CR 503)
- Barrell Avenue & Washington Avenue (CR 503)
- Veterans Boulevard & Washington Avenue (CR 503)
- Road A & Washington Avenue (CR 503)

Washington Avenue (CR 503) is located in Carlstadt Borough in Bergen County. It is a major north-south route through the borough that connects NJ Route 120 in the south to US Route 46 in the north. It is located approximately 0.5 miles west of the New Jersey Turnpike, 1.5 miles east of NJ Route 17, 2.5 miles south of Interstate 80, and just north of the Meadowlands Sports Complex.

The Road Safety Audit (RSA) area is a corridor of 1.6 miles that acts as a through road for traffic and serves the local businesses, which are primarily industrial and office buildings. There are three signalized intersections and numerous unsignalized intersections and driveways. There are at least three bus routes that run in the RSA area.

The roadway section has two lanes in each direction with no shoulders. There are a few sections divided by a Jersey barrier. There are jughandles at Veterans Boulevard and at Moonachie Road. The road is classified as an "Urban Principal Arterial" with a speed limit of 40 mph.

Washington Avenue is under the jurisdiction of Bergen County.

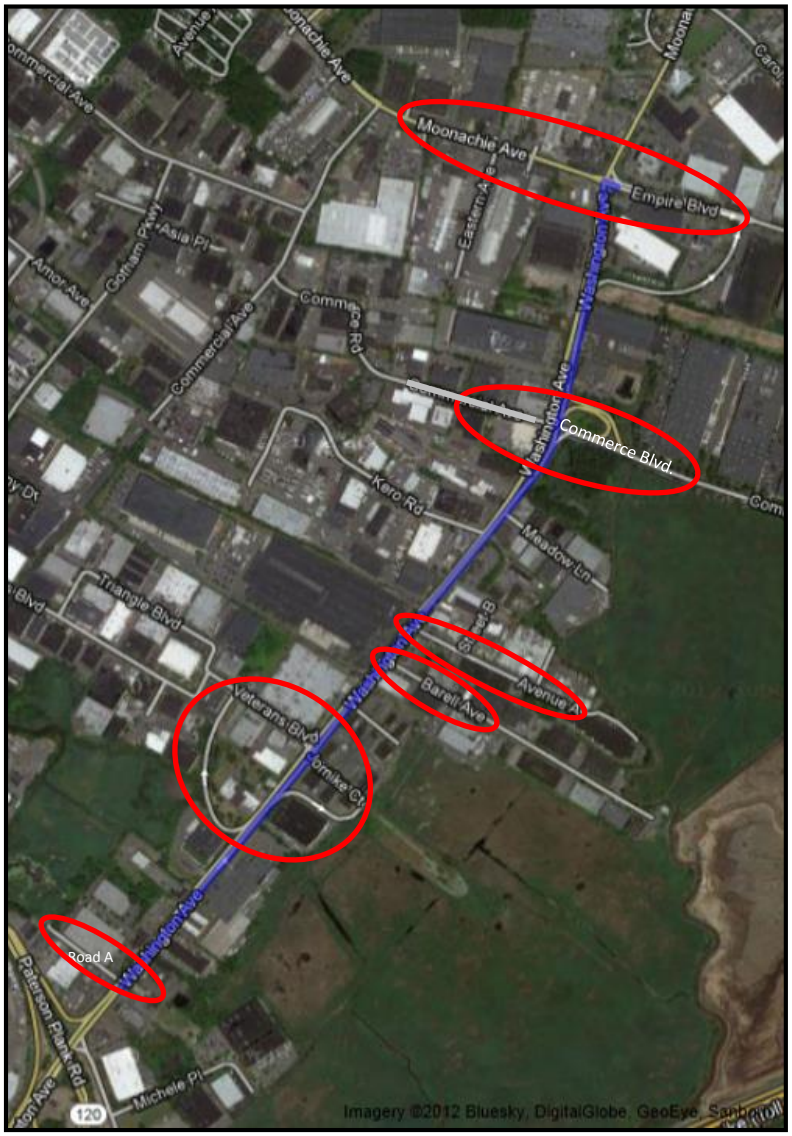

Figure 1 – Map of Intersections in RSA Study

The intersection of **Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)** is a four-legged signalized intersection. There are two lanes in each direction on southbound Washington Avenue. On northbound Washington Avenue, the two lanes become one lane north of the intersection. Moonachie Road and Empire Boulevard (CR 36) also have two lanes in each direction. There is a left turn prohibition for Washington Avenue northbound and the left turn is done via Terminal Road, a jughandle with the access 850 feet south of the intersection. There is a gas station on the southwest corner with access from both Washington Avenue and Moonachie Road. There are additional driveways on Moonachie Road adjacent to the intersection. Empire Road has a curbed mountable median approaching the intersection.

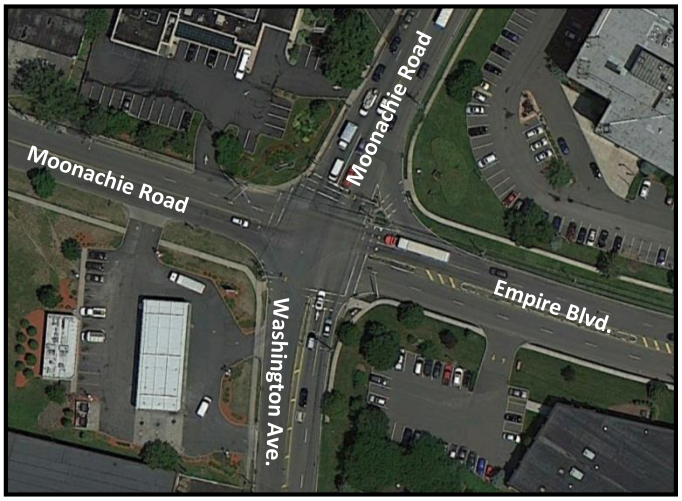

Figure 2 – Moonachie Road/Empire Blvd. (CR 36) & Washington Ave. (CR 503)

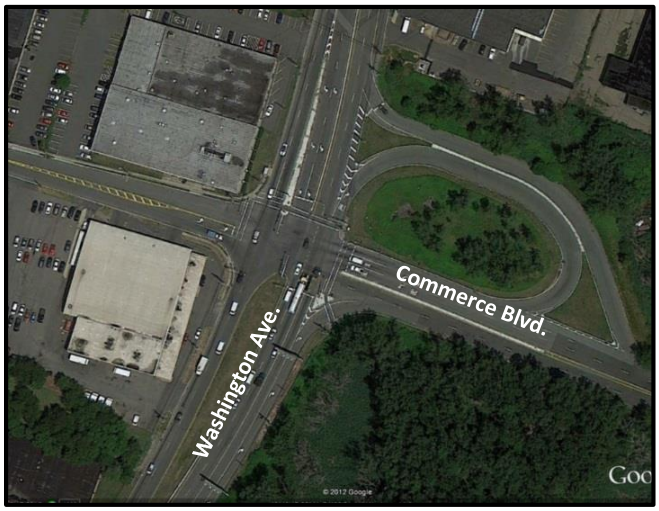

Figure 3 – Commerce Blvd. & Washington Ave. (CR 503)

The intersection of **Commerce Boulevard & Washington Avenue (CR 503)** has two through lanes in each direction. Northbound Washington Avenue has a dedicated right-turn lane to Commerce Blvd. eastbound and an adjacent lane to the westbound Commerce Blvd. ramp. Southbound, Washington Avenue has a median between the through lanes and the dedicated two left-turn lanes. A Jersey barrier divides the northbound and southbound lanes north of the intersection and a wide grassy median separates them south of the intersection. Commerce Blvd. has two dedicated westbound left-turn lanes with one through lane. Eastbound, there is one dedicated left-turn lane and one through lane.

Avenue A & Washington Avenue (CR 503) is a T-intersection with stop control. Avenue A is an access road to local businesses. Washington Avenue has a striped median, and the intersection has no accommodations for pedestrians.

Figure 4 – Avenue A & Washington Ave.

Figure 5– Barrell Ave. & Washington Ave. (CR 503)

The intersection of **Barrell Avenue & Washington Avenue (CR 503)** is a T-intersection with stop control. Barrell Avenue is an access road to local businesses. Washington Avenue has a striped median. The intersection has no accommodations for pedestrians.

The intersection of **Veterans Boulevard & Washington Avenue (CR 503)** has two through lanes in each direction. The roadway is divided by a Jersey barrier. Left turns from both directions on the mainline are completed using large jughandles. The right turns, with slip ramps, are yield controlled. Veterans Boulevard has one lane in each direction with a dedicated left-turn lane.

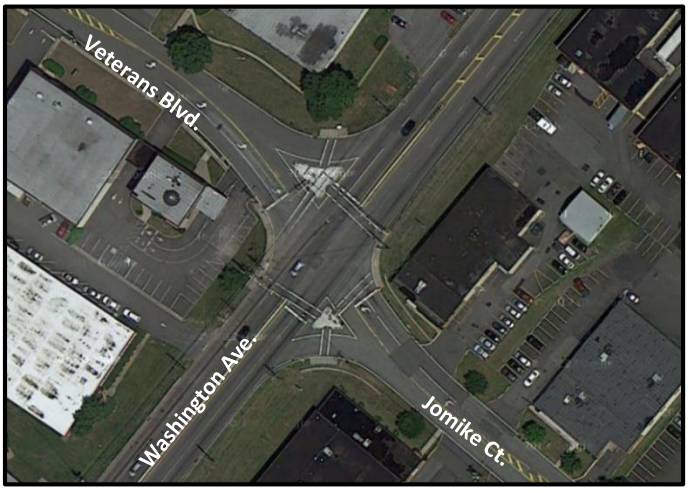

Figure 6 – Veterans Blvd. & Washington Ave. (CR 503)

Figure 7 – Road A & Washington Ave. (CR 503)

The intersection of **Road A & Washington Avenue (CR 503)** is a T-intersection with stop control. Washington Avenue has two lanes in each direction with a painted median. There is a bus stop on the northwest corner (Washington Avenue southbound). There is a sign for pedestrian crossing north of the intersection but no marked crosswalk.

Road Safety Audit Process

The Washington Avenue (CR 503) RSA followed a process that began with data collection, a crucial task that served as the backbone for recommendations for improvement. At the selected sites, crash data was collected using Plan4Safety, a crash data analysis tool, and consisted of crash types, locations, years, road conditions, and contributing circumstances. Using the crash data, crash diagrams, as shown in Appendix B, were produced that showed crash types and locations.

Figure 9 –RSA Team Conducting Site Visit

The Road Safety Audit occurred on Friday, April 12, 2013. (The RSA was originally scheduled for October 31, 2012, but was cancelled due to Hurricane Sandy.) The day began with a pre-audit meeting that involved the definition of a road safety audit and an overview of the intersections. A presentation was shown detailing the crash analysis and aerial images of the different sites. Following the presentation, site visits were conducted where all participants were given a chance to inspect the sites and utilize their various backgrounds to brainstorm recommended improvements. After the site visits, the team was brought back together to discuss the issues observed and suggested recommendations to remedy the issues.

Information Sources

Several sources of information were used in the RSA process. For example, crash data from 2009 to 2011 was examined for trends and patterns. Specific resources used in the analysis include:

- NJDOT Crash Database (2009–2011)
- Plan4Safety Crash Data Analysis Tool
- Highway Safety Manual
- NJTR-1 Crash Reports
- NJDOT Straight Line Diagrams
- Google Earth

RSA Team

The RSA team consisted of 17 members, including police officers, engineers, and planners from different agencies across the state.

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Crash Data

As of the date of this report, the crash data reported by the NJDOT shows a total of 111 crashes occurring during the three-year period from 2009 to 2011 along the RSA corridor. As of the original date of the RSA (October 31, 2012), 2011 was the latest full year of crash data available. The six studied intersections had 85 of those crashes.

RSA Crash Locations

The intersections along the Washington Avenue corridor, which were selected for further analyses based on crash data, are as follows:

- Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)
- Commerce Boulevard & Washington Avenue (CR 503)
- Avenue A & Washington Avenue (CR 503)
- Barrell Avenue & Washington Avenue (CR 503)
- Veterans Boulevard & Washington Avenue (CR 503)
- Road A & Washington Avenue (CR 503)

The following tables show detailed statistics of the crash data analyzed for each of the six intersections studied in the RSA.

Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)

As seen from the tables below, more than a third of the crashes were “Same Direction” crashes (consisting of “Rear End” and “Side Swipe”), and a third of the crashes were “Right Angle” crashes. Very few of the crashes were injury crashes. Less than a fourth of the crashes occurred in dark or dusk conditions and wet or icy conditions.

Table 3 shows that there was a variety of contributing circumstances; “Driver Inattention,” “Failure to Yield,” and “Improper Turning” occurred more frequently. A higher percentage of “Pre-Crash Vehicle Action” was from “Straight Ahead,” “Starting in Traffic,” or “Slowing or Stopping,” while right or left turns were less common.

Moonachie Road/Empire Boulevard & Washington Avenue		CRASH TYPE							
		Same Direction – Rear End	Same Direction – Side Swipe	Right Angle	Left Turn / U-Turn	Backing	Fixed Object	Pedestrian	TOTAL
SEVERITY	Property Damage	3	4	8	3	2	1		**21**
	Injury	2		1				1	**4**
	TOTAL	**5**	**4**	**9**	**3**	**2**	**1**	**1**	**25**

Table 1 – Crash Type vs. Severity

Moonachie Road/Empire Boulevard & Washington Avenue		LIGHT CONDITIONS			
		Daylight	Dusk	Dark (Street Lights On / continuous)	TOTAL
SEVERITY	Dry	14	1	4	**19**
	Wet	3		1	**4**
	Snowy	1			**1**
	Icy	1			**1**
TOTAL		**19**	**1**	**5**	**25**

Table 2 – Light Condition vs. Surface Condition

Moonachie Road/Empire Boulevard & Washington Avenue		PRE-CRASH VEHICLE ACTION										
		Going Straight Ahead	Making Right Turn (not turn on red)	Making Left Turn	Starting in Traffic	Slowing or Stopping	Stopped in Traffic	Changing Lanes	Backing	Passing	Right Turn on Red	TOTAL
CONTRIBUTING CIRCUMSTANCES	Unsafe Speed					1						**1**
	Driver Inattention	3	2	1		1	1					**8**
	Failed to Yield Right of Way to Vehicle/Pedestrian		1	3							1	**5**
	Improper Passing							1		2		**3**
	Improper Turning			5								**5**
	Following Too Closely	1										**1**
	Backing Unsafely								1			**1**
	Improper Parking								1			**1**
	None (Driver/Pedcycle)	14		1	1	2	4					**22**
	Road Surface Condition					1						**1**
TOTAL		**18**	**3**	**10**	**1**	**5**	**5**	**1**	**2**	**2**	**1**	

Table 3 – Contributing Circumstances vs. Pre-Crash Vehicle Action

Commerce Boulevard & Washington Avenue (CR 503)

Commerce Blvd. & Washington Ave. (CR 503)		CRASH TYPE						
		Same Direction – Rear End	Same Direction – Side Swipe	Right Angle	Backing	Fixed Object	Non-fixed Object	TOTAL
SEVERITY	Property Damage	5	1	1	1	1	1	**10**
	Injury	3		1				**4**
	TOTAL	**8**	**1**	**2**	**1**	**1**	**1**	**14**

Table 4 – Crash Type vs. Severity

Commerce Blvd. & Washington Ave. (CR 503)		ENVIRONMENTAL CONDITIONS			
		Clear	Rain	Snow	TOTAL
LIGHT CONDITIONS	Daylight	14			**14**
	Dawn				
	Dusk				
	Dark (Street Lights Off)				
	Dark (No Street Lights)				
TOTAL		**14**	**0**	**0**	**14**

Table 5 – Environmental Conditions vs. Light Condition

As can be seen in the tables above, more than 60 percent of the crashes were “Same Direction” (Rear End and Side Swipe). Less than a third of the crashes resulted in injury. All of the crashes occurred during daylight hours and with clear conditions. More than 70 percent of the crashes occurred between vehicles going in the same direction: “Going Straight Ahead,” “Starting in Traffic,” “Slowing or Stopping,” and “Stopped in Traffic.”

Commerce Blvd. & Washington Ave. (CR 503)		PRE-CRASH VEHICLE ACTION									
		Going Straight Ahead	Making Right Turn (not turn on red)	Making Left Turn	Starting in Traffic	Slowing or Stopping	Stopped in Traffic	Parked	Backing	Negotiating Curve	TOTAL
CONTRIBUTING CIRCUMSTANCES	**Driver Inattention**	2		1		1	1				**5**
	Failed to Obey Traffic Control Device (Driver/Pedcycle)	1									**1**
	Improper Turning		1								**1**
	Following Too Closely	2			1	1					**4**
	Backing Unsafely								1		**1**
	None (Driver/Pedcycle)	1		2		2	6	1			**12**
	Other Driver/Pedalcyclist Action	1									**1**
	Wheels			1							**1**
	Road Surface Condition									1	**1**
TOTAL		**7**	**1**	**4**	**1**	**4**	**7**	**1**	**1**	**1**	

Table 6 – Contributing Circumstances vs. Pre-Crash Vehicle Action

Avenue A & Washington Avenue (CR 503)

Avenue A & Washington Ave. (CR 503)		CRASH TYPE		
		Same Direction – Side Swipe	Right Angle	TOTAL
SEVERITY	Property Damage		2	**2**
	Injury	2	1	**3**
	TOTAL	**2**	**3**	**5**

Table 7 – Crash Type vs. Severity

Avenue A & Washington Ave. (CR 503)		PRE-CRASH VEHICLE ACTION				
		Going Straight Ahead	Making Right Turn (not turn on red)	Making Left Turn	Changing Lanes	TOTAL
CONTRIBUTING CIRCUMSTANCES	Driver Inattention	1				**1**
	Failed to Obey Traffic Control Device (Driver/Pedcycle)		1			**1**
	Failed to Yield Right of Way to Vehicle/Pedestrian	1		1		**2**
	Improper Lane Change				2	**2**
	None (Driver/Pedcycle)	3		1		**4**
TOTAL		**5**	**1**	**2**	**2**	

Table 8 – Pre-Crash Vehicle Action vs. Contributing Circumstances

Avenue A & Washington Ave. (CR 503)		SURFACE CONDITIONS				
		Dry	Wet	Snowy	Icy	TOTAL
LIGHT CONDITIONS	Daylight	2	3			**5**
	Dawn					
	Dusk					
	Dark (Street Lights Off)					
	Dark (No Street Lights)					
	Dark (Street Lights On/Continuous)					
	TOTAL	**2**	**3**	**0**	**0**	**5**

Table 9 – Surface Conditions vs. Light Conditions

The crashes were almost evenly divided between “Right Angle” and “Same Direction – Side Swipe” crashes. The crashes occurred in both “Dry” and “Wet” conditions although all of the crashes occurred during “Daylight” hours. There was no predominant “Contributing Circumstance,” and half of the crashes occurred with vehicles “Going Straight Ahead.”

Barrell Avenue & Washington Avenue (CR 503)

Barrell Ave. & Washington Ave. (CR 503)		CRASH TYPE				
		Same Direction – Side Swipe	Right Angle	Opposite Direction – Head On/Angular	Left Turn / U-Turn	TOTAL
SEVERITY	Property Damage	1	3	1		**5**
	Injury		3		1	**4**
	TOTAL	**1**	**6**	**1**	**1**	**9**

Table 10 – Crash Type vs. Severity

Barrell Ave. & Washington Ave. (CR 503)		SURFACE CONDITIONS				
		Dry	Wet	Snowy	Icy	TOTAL
LIGHT CONDITIONS	Daylight	6	2			**8**
	Dawn					
	Dusk					
	Dark (Street Lights Off)					
	Dark (No Street Lights)					
	Dark (Street Lights On/Continuous)		1			**1**
TOTAL		**6**	**3**	**0**	**0**	**9**

Table 11 – Light Condition vs. Surface Condition

Barrell Ave. & Washington Ave. (CR 503)		PRE-CRASH VEHICLE ACTION				
		Going Straight Ahead	Making Right Turn (not turn on red)	Making Left Turn	Changing Lanes	TOTAL
CONTRIBUTING CIRCUMSTANCES	Failed to Yield Right of Way to Vehicle/Pedestrian		1	1		**2**
	Improper Lane Change				1	**1**
	Improper Turning			5		**5**
	None (Driver/Pedcycle)	9				**9**
	Other Driver/Pedalcyclist Action	2				**2**
	TOTAL	**11**	**1**	**6**	**1**	

Table 12 – Contributing Circumstances vs. Pre-Crash Vehicle Action

Two-thirds of the crashes were “Right Angle” crashes with almost half of all the crashes resulting in injury. All of the crashes occurred during “Daylight” hours, and two-thirds of the crashes occurred in “Dry” conditions. More than a quarter of the crashes occurred while “Making Left Turn,” while the contributing circumstances for those were “Improper Turning.” The most common “Pre-Crash Vehicle Action” was “Going Straight Ahead”.

Veterans Boulevard & Washington Avenue (CR 503)

Veterans Blvd. & Washington Ave. (CR 503)		CRASH TYPE					
		Same Direction – Rear End	Same Direction – Side Swipe	Right Angle	Opposite Direction – Side Swipe	Fixed Object	TOTAL
SEVERITY	**Property Damage**	6	1	3	1	2	**13**
	Injury	4		1		1	**6**
	TOTAL	**10**	**1**	**4**	**1**	**3**	**19**

Table 13 – Crash Type vs. Severity

Veterans Blvd. & Washington Ave. (CR 503)		SURFACE CONDITIONS			
		Dry	Wet	Icy	TOTAL
SEVERITY	**Daylight**	11	4	2	**17**
	Dark (Street Lights On/Continuous)	1	1		**2**
	TOTAL	**12**	**5**	**2**	**19**

Table 14 – Light Condition vs. Surface Condition

As can be seen from the tables above, there was a variety of crash types without any one type being predominant. Most of the crashes occurred during the daylight hours and in dry conditions. Almost all of the crashes occurred with vehicles either "Going Straight Ahead," "Slowing or Stopping," or "Stopped in Traffic."

Veterans Blvd. & Washington Ave. (CR 503)		PRE-CRASH VEHICLE ACTION				
		Going Straight Ahead	Making Left Turn	Slowing or Stopping	Stopped in Traffic	TOTAL
CONTRIBUTING CIRCUMSTANCES	**Unsafe Speed**	1		1		**2**
	Driver Inattention	2		3		**5**
	Failed to Obey Traffic Control Device (Driver/Pedcycle)	4				**4**
	Following Too Closely	2		2		**4**
	None (Driver/Pedcycle)	5	1	4	5	**15**
	Other Driver/Pedalcyclist Action	1				**1**
	Tires	1				**1**
	TOTAL	**16**	**1**	**10**	**5**	

Table 15 – Pre-Crash Vehicle Action vs. Contributing Circumstances

Road A & Washington Avenue (CR 503)

Road A & Washington Ave. (CR 503)		CRASH TYPE					
		Same Direction – Rear End	Same Direction – Side Swipe	Right Angle	Left Turn / U-Turn	Backing	TOTAL
SEVERITY	Property Damage	1	1	3	1	1	**7**
	Injury		2	3			**5**
	TOTAL	**1**	**3**	**6**	**1**	**1**	**12**

Table 16 – Crash Type vs. Severity

Road A & Washington Ave. (CR 503)		SURFACE CONDITIONS				
		Dry	Wet	Snowy	Icy	TOTAL
LIGHT CONDITIONS	Daylight	6	2			**8**
	Dawn					
	Dusk					
	Dark (Street Lights On/Continuous)	2	1	1		**4**
	Dark (Street Lights On/Spot)					
	TOTAL	**8**	**3**	**1**	**0**	**12**

Table 17 – Light Condition vs. Surface

As can be seen from Table 15 and Table 16 above, half of the crashes were “Right Angle” crashes. Forty-two percent of the crashes resulted in injury. A third of the crashes occurred in dark conditions as well as wet or snowy conditions.

In Table 18 below, the most common “Pre-Crash Vehicle Action” was “Going Straight Ahead,” with “Making Left Turn” crashes the second-most common.

Road A & Washington Ave. (CR 503)		PRE-CRASH VEHICLE ACTION						
		Going Straight Ahead	Making Right Turn (not turn on red)	Making Left Turn	Stopped in Traffic	Changing Lanes	Backing	TOTAL
CONTRIBUTING CIRCUMSTANCES	Driver Inattention			2				**2**
	Failed to Yield Right of Way to Vehicle/Pedestrian		1	4				**5**
	Improper Lane Change			1		1		**2**
	Following Too Closely	1						**1**
	Backing Unsafely						1	**1**
	None (Driver/Pedcycle)	8			2			**10**
	Other Driver/Pedalcyclist Action	3						**3**
TOTAL		**12**	**1**	**7**	**2**	**1**	**1**	

Table 18 – Contributing Circumstances vs. Pre-Crash Vehicle

RSA Team Identified Issues

The following represents the specific findings and recommendations made by the RSA team. All recommendations and designs should be thoroughly evaluated with due diligence and designed as appropriate by the roadway owner and/or a professional engineer for conformance to codes, standards, and best practices.

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Pedestrians – General							
1	Pedestrian accommodations are not fully ADA compliant.	X						
30	Extensive lack of sidewalk connectivity throughout the entire length of Washington Avenue (CR 503) RSA corridor.	X						

Tripping Hazard

Lack of sidewalk connectivity

Push button not adjacent to crosswalk

Pedestrians are forced to walk in the roadway

Need for additional sidewalk

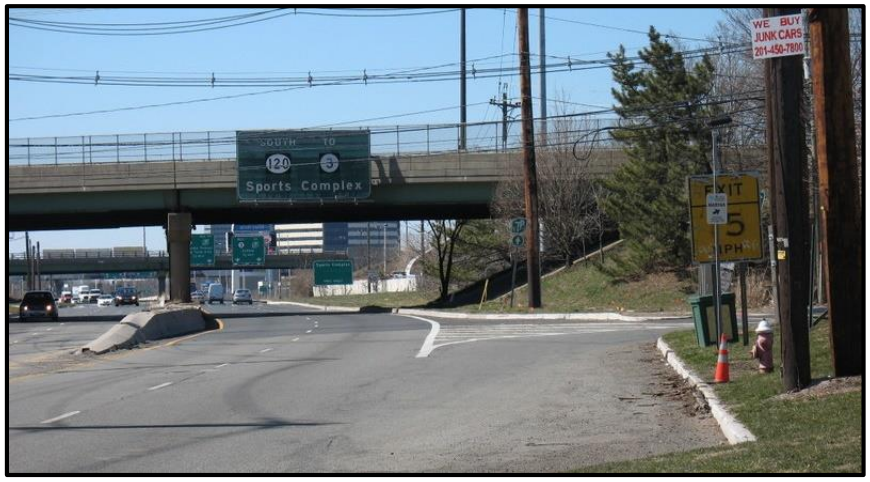
Pedestrians are forced to walk in the roadway

Lack of sidewalk connectivity

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Pedestrians – Unsignalized Intersections							
2	Insufficient number of marked crosswalks.		X		X	X		
3	Heavy volume of midblock pedestrians crossing when events take place at stadium.		X					
4	The roadway is challenging to cross.		X		X	X		

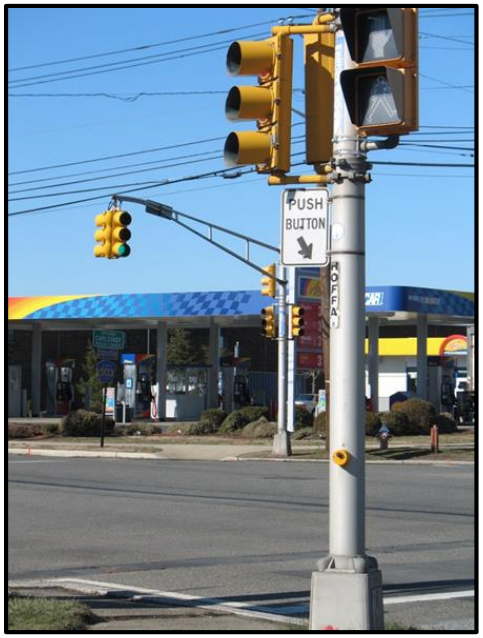
Lack of marked crosswalk (although signed)

Pedestrian crossing midblock



During sporting events at the Meadowlands, south of the RSA corridor, there is parking along Washington Avenue, with no pedestrian accommodations for pedestrians to access the Meadowlands.

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Pedestrians – Signalized Intersections							
5	There are limited or no countdown pedestrian heads.			X			X	X
6	The pedestrian push button orientation is misaligned.			X			X	X
7	Crosswalk is missing or crosswalk striping is worn and not clearly visible.			X			X	X



No countdown pedestrian head

Pedestrian push button not adjacent to crosswalk

Worn crosswalk striping

	Washington Avenue in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Buses							
8	Locations of bus stops do not provide safe passenger waiting areas.	X	X	X	X	X	X	X
9	Bus stop is located behind the guide rail that is directly adjacent to the edge of the travel lane.				X			

No defined waiting area for bus passengers

Bus stop and guide rail adjacent to travel way

No defined waiting area for bus passengers

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Speeding							
10	Vehicles travelling from Route 120 to Washington Avenue (CR 503) fail to transition from higher speeds.		X					
11	Significant amount of speeding throughout the project corridor.	X	X	X	X	X	X	X

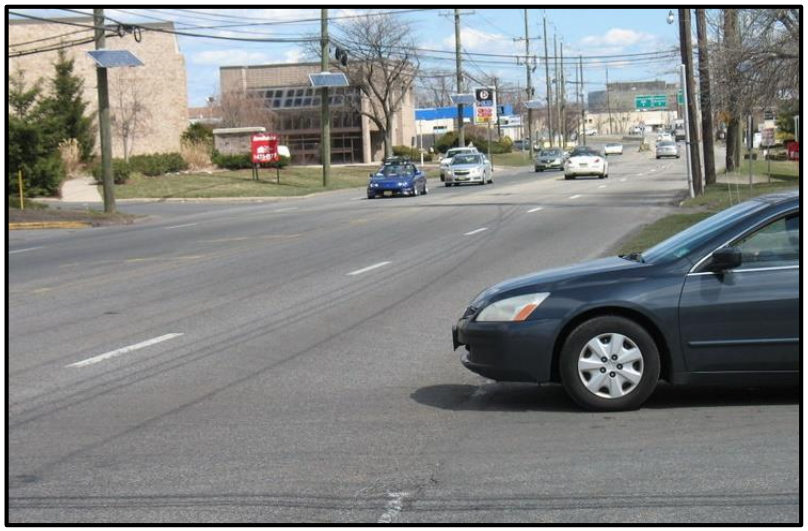
	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Roadway & Geometric Design							
17	Trucks frequently impact curb due to tight radius.				X	X		
32	The corridor could benefit from additional lighting.	X						
33	There are numerous ponding issues especially on Washington Avenue (CR 503) southbound, adjacent to gas station exit.	X	X					
16	Limited sight distance causes encroachment.				X	X		

Damage from turning trucks

Tight turning radius

Ponding issues

Unsafe location for bus stop



Encroachment

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Signals							
18	Not all of the traffic signal heads are 12”			X			X	X
19	The signal timing may be contributing to crash incidents.			X			X	X
20	Controller is antiquated.							X
21	Traffic signal design not in conformance with modern best practices.							X
22	The traffic signal heads have limited visibility.			X			X	X
23	Jughandle not consistently being utilized by northbound left-turning vehicles.							X
24	Restricted turning movements not properly signed.							X
25	Unmarked merge north of intersection.							X

Utility wires block signals

Limited signage for jughandle

Antiquated signal controller

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard (CR 36)
	Maintenance							
31	Faded roadway markings are not clearly visible.	X						

Faded yellow roadway markings

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Driveway and Unsignalized Intersections							
26	Missing “No Left Turn” sign.				X			
27	Stop sign is set too far back from the intersection.					X		
28	Street identification signs are lacking, not clearly visible, or not standard.		X		X	X		
29	Restricted turning movements not sufficiently signed.			X			X	X

Inconsistency in street identification signs

Stop sign set far back from intersection

	Washington Avenue (CR 503) in Carlstadt Borough Bergen County	Corridor	Road A	Veterans Boulevard	Barrell Avenue	Avenue A	Commerce Boulevard	Moonachie Road/Empire Boulevard
	Crash History							
12	High number of crashes at signalized intersections (53 percent of the corridor).			X			X	X
13	Thirty-six percent of the corridor crashes were right angle crashes with three intersections being overrepresented (two unsignalized and one signalized).		X		X			X
14	Forty-seven percent of the crashes along the corridor were same direction crashes; 73 percent occurred at intersections with two intersections being overrepresented.			X			X	
15	Fatal pedestrian crash in fall 2012 at midblock crossing between Redds Restaurant and the gas station.		X					

Recommendations

The following are recommendations for the issues that are detailed in the RSA Team Finding section. The recommendations are divided up by the cost and effort involved with their implementation: Long Term, Medium Term, and Short Term; the divisions are subjective and fluid.

The intersections are all under the jurisdiction of Bergen County:

A – Improve Pedestrian Accommodations

	Short Term	Cost	Safety Benefit
A-1	The addition of pedestrian way-finding signs to clearly direct pedestrians may increase safer pedestrian behavior.	$	Medium
A-2	Replace worn and missing striping with pavement markings in conformance with the MUTCD, while keeping style of crosswalk striping consistent throughout corridor. CMF=0.6; Install high-visibility crosswalk http://www.cmfclearinghouse.org/study_detail.cfm?stid=280	$	High
A-3	Consider installing the unmarked southerly crosswalk across Washington Avenue (CR 503), and signalize accordingly. (Commerce Blvd.)	$	Medium
A-4	**FHWA Proven Countermeasure**: At the currently signed statutory crosswalk at Road A, install high-visibility pavement markings indicating the crosswalk and install a pedestrian refuge island. CMF=0.6; Install high-visibility crosswalk http://www.cmfclearinghouse.org/study_detail.cfm?stid=280	$	High

	Medium Term	Cost	Safety Benefit
A-5	Improve appearance of pedestrian crossings to encourage pedestrian compliance with crossing at marked crosswalks.	$$	Medium/High
A-6	Plan for full ADA compliance by scheduling upgrades of existing ramps and curbs at crosswalks.	$$	Medium
A-7	**FHWA Proven Countermeasure:** Consider the installation of a pedestrian refuge island in a marked crosswalk at Road A and other locations where pedestrian demand exists.	$$	Medium/High

	Long Term	Cost	Safety Benefit
A-8	**2009 FHWA Proven Countermeasure:** Consider the needs of pedestrians, and complete the sidewalk network along the roadway to allow safe pedestrian movement. Due to the steep slopes on the east side of Washington Avenue (CR 503), the sidewalk may be easier to implement on the west side of Washington Avenue (CR 503).	$$$	High
A-9	Evaluate the addition of a concrete barrier with a pedestrian fence to block off heavy pedestrian volume from cars parked in the vicinity of Washington Avenue (CR 503) during sporting events.	$$	High
A-10	**FHWA Proven Countermeasure:** Consider the needs of pedestrians, and install signals, HAWK Beacons, or other traffic control devices to safety allow pedestrians to cross in areas where demand exists, including the vicinity of Road A/Redds Restaurant where a pedestrian fatality occurred.	$$	High
	CMF: 0.712; Safety Effectiveness of the HAWK Pedestrian Crossing Treatment http://www.cmfclearinghouse.org/study_detail.cfm?stid=196		

	Concerns Addressed:
1	Pedestrian accommodations are not fully ADA compliant.
2	Insufficient number of marked crosswalks.
3	Heavy volume of midblock pedestrians crossing when events take place at stadium.
4	The roadway is challenging to cross.
5	There are limited or no countdown pedestrian heads.
6	The pedestrian push button orientation is misaligned.
7	Crosswalk is missing or crosswalk striping is worn and not clearly visible.
15	Fatal pedestrian crash in fall 2012 crossing between Redds Restaurant and the gas station.
30	Extensive lack of sidewalk connectivity throughout the entire length of Washington Avenue (CR 503) RSA corridor.

B – Make Improvements to the Existing Signals at Veterans Boulevard and Commerce Boulevard

	Short Term	Cost	Safety Benefit
B-1	Schedule the realignment of the pedestrian push buttons in conformance with the MUTCD.	$	Low
B-2	Evaluate the signal timing and consider revising the timing to improve traffic operations.	$	Low
B-3	**2009 FHWA Proven Countermeasure:** Review the current change and clearance intervals – and if applicable, increase to meet current standards.	$	Medium
B-4	**FHWA Proven Countermeasure:** Consider the installation of backplates with retroreflective borders. CMF=0.85; Add 3-inch yellow retroreflective sheeting to signal backplates http://www.cmfclearinghouse.org/study_detail.cfm?stid=85	$	Medium

	Medium Term	Cost	Safety Benefit
B-5	Consider upgrading the signal heads to 12-inch LED. CMF=0.93; Evaluating the Safety Impacts of Improving Signal Visibility at Urban Signalized Intersections http://www.cmfclearinghouse.org/study_detail.cfm?stid=83 CMF=0.58; Replace 8-inch red signal heads with 12-inch. http://www.cmfclearinghouse.org/study_detail.cfm?stid=140	$	Medium

	Long Term	Cost	Safety Benefit
B-6	Evaluate the warning lights at the fire station and consider revising the preemption at Veterans Boulevard.	$$$	Low
B-7	Consider the installation of additional clamp mounted signal heads at Veterans Boulevard due to visibility conflicts with overhead utilities. CMF=0.72; Add signal (additional primary head) http://www.cmfclearinghouse.org/study_detail.cfm?stid=65	$$	Medium/High
B-8	Consider the installation of countdown pedestrian heads at both Commerce Boulevard and Veterans Boulevard.	$$	Medium
B-9	**FHWA Proven Countermeasure:** Consider the installation of high friction surface treatment at the intersections of Commerce Boulevard and Veterans Boulevard. CMF=0.799; Improve pavement friction (increase skid resistance) http://www.cmfclearinghouse.org/study_detail.cfm?stid=144	$$	Medium/High
B-10	Revise mast-arm signage, especially “Emergency Signal” mast-arm sign to provide better signal head visibility to the motorist at Veterans Boulevard.	$$	Medium

	Concerns Addressed:
5	There are limited or no countdown pedestrian heads.
6	The pedestrian push button orientation is misaligned.
12	High number of crashes at signalized intersections (53 percent of the corridor).
14	Forty-seven percent of the crashes along the corridor were same direction crashes; 73 percent occurred at intersections with two intersections being overrepresented.
15	Fatal pedestrian crash in fall 2012 crossing between Redds Restaurant and the gas station.
18	Not all of the traffic signal heads are 12-inch size.
19	Investigate the red and yellow signal clearance timing.
22	The traffic signal heads have limited visibility.

C – Upgrade the Intersection of Moonachie Road/Empire Boulevard (CR36)

	Short Term	Cost	Safety Benefit
C-1	Consider revising the striping on Washington Avenue (CR 503) northbound and adding signage to clearly delineate the reduction in travel lanes past the intersection.	$	Medium
C-2	Provide additional regulatory signage of the northbound left-turn prohibition at the intersection.	$	Low

	Long Term	Cost	Safety Benefit
C-3	Consider a full upgrade of the traffic signals including the controller and pedestrian countdown heads.	$$$	High
C-4	Traffic operations could be improved by implementing geometric and/or lane use modifications to allow for zero-offset (head to head) left turns or positive offset left turns at eastbound Moonachie Road/Empire Boulevard (CR 36).	$$$	High
C-5	Consider upgrading the signal heads to 12-inch LED at Moonachie Road/Empire Boulevard (CR 36). CMF=0.58; Replace 8-inch red signal heads with 12-inch. http://www.cmfclearinghouse.org/study_detail.cfm?stid=140	$	Medium
C-6	Schedule the realignment of the pedestrian push buttons in conformance with the MUTCD at Moonachie Road/Empire Boulevard (CR 36).	$	Low
C-7	Evaluate the signal timing and consider revising the timing to improve traffic operations at Moonachie Road/ Empire Boulevard (CR 36).	$	Medium
C-8	**FHWA Proven Countermeasure:** Consider the installation of backplates with retroreflective borders. CMF=0.85; Add 3-inch yellow retroreflective sheeting to signal backplates http://www.cmfclearinghouse.org/study_detail.cfm?stid=85	$	Medium
C-9	**2009 FHWA Proven Countermeasure:** Review the current change and clearance intervals – and if applicable, increase to meet current standards.	$	Medium
C-10	Provide additional way-finding signage of the northbound left-turn prohibition in advance of the jughandle.	$	Medium
C-11	Consider the installation of countdown pedestrian heads.	$$	Medium
C-12	**FHWA Proven Countermeasure:** Consider the installation of high friction surface treatment at the intersection. CMF=0.799; Improve pavement friction (increase skid resistance) http://www.cmfclearinghouse.org/study_detail.cfm?stid=144	$$	Medium/High

	Concerns Addressed:
5	There are limited or no countdown pedestrian heads.
6	The pedestrian push button orientation is misaligned.
12	High number of crashes at signalized intersections (53 percent of the corridor).
13	Thirty-six percent of the corridor crashes were right angle crashes with three intersections being overrepresented (two unsignalized and one signalized).
14	Forty-seven percent of the crashes along the corridor were same direction crashes; 73 percent at intersections (rear end and side swipe).
18	Not all of the traffic signal heads are 12-inch size.
19	Investigate the red and yellow signal clearance timing.
20	Controller is antiquated.
21	Traffic signal design not in conformance with modern best practices.
22	The traffic signal heads have limited visibility.
23	Jughandle not consistently being utilized by northbound left-turning vehicles.
24	Restricted turning movements not properly signed.
25	Unmarked merge north of intersection.

D – (FHWA Proven Countermeasure) Corridor Access Management

	Medium Term	Cost	Safety Benefit
D-1	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider limiting left turns from both driveways and minor unsignalized roadways in the corridor. CMF=0.8; Replace direct left turn with right turn/U-turn (all crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=60	$	Medium/High
D-2	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider the installation of a two-way left-turn lane (TWLT) in areas where a current painted hashed median operates as a TWLT. CMF=0.8; Add two-way left-turn lane (all crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=72	$	Medium/High
D-3	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider restricting turns in and out of both Road A and the gas station to right-turns only.	$	Medium
D-4	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider closing off the access at the corner of the gas station at Road A.	$	Medium
D-5	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider installation of “No Left Turn” signs at Road A, Avenue A, and Barrel Avenue.	$	Medium/High

	Long Term	Cost	Safety Benefit
D-6	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider the modification of the existing easement to Michele Place to align with a new signal at Road A. This will allow for enhanced network connectivity, and help in reducing some of the turning traffic along Washington Avenue (CR 503) by relocating local traffic.	$$$	High
D-7	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, limit left turns from both driveways and minor/unsignalized roadways in the corridor. CMF=0.8; Replace direct left turn with right turn/U-turn (all crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=60	$	High
D-8	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider the installation of a center median and/or island where none currently exists and where left turning movements will be eliminated.	$$	Medium/High
D-9	In conjunction with the center median, consider the addition of pedestrian median fencing.	$$	Medium/High
D-10	**FHWA Proven Countermeasure:** Consider the installation of a median, which can serve as a refuge for pedestrian mid-block crossings.	$$	High
D-11	**2009 FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider the needs of pedestrians, and complete the sidewalk network along the roadway to allow safe pedestrian movement.	$$$	High
D-12	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, bus operations should be reviewed. Bus stops should be at locations that provide a safe area outside of a live-lane for the bus to load/unload passengers. Also, consider the needs of the bus passengers as pedestrians, providing a safe waiting areas and access from a pedestrian network. CMF=0.55; Presence of far-side transit stop location (transit-related crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=112 CMF=1.38; Presence of near-side transit stop location (transit-related crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=112	$+	High
D-15	**FHWA Proven Countermeasure:** As part of a Corridor Access Management plan, consider closing the openings along the median on Moonachie Road/Empire Boulevard (CR 36) that no longer serve driveways.	$	Medium
D-16	The traffic patterns and impacts from events at the Meadowlands Sports Complex should be further evaluated, including parking in the RSA corridor and pedestrian access to the Meadowlands.	$$+	High

	Concerns Addressed:
3	Heavy volume of midblock pedestrians crossing when events take place at stadium.
4	The roadway is challenging to cross.
8	Locations of bus stops do not provide safe areas for passengers to wait for and alight from bus.
9	Bus stop adjacent guide rail located at edge of travel lane puts passenger in way of live traffic.
13	High proportion of right-angle and left-turn crashes (36 percent of the corridor).
24	Restricted turning movements not properly signed.
30	Extensive lack of sidewalk connectivity throughout the entire length of Washington Avenue (CR 503) RSA corridor.

E – Provide Drivers Clear Information and Visibility of the Roadway

	Short Term	Cost	Safety Benefit
E-1	Consider the installation of an additional advance warning sign to alert drivers of the need to take Terminal Road for left turns. (Moonachie Road/Empire Boulevard (CR 36)))	$	Medium
E-2	Ensure advance intersection warning signage and properly mark the names of Avenue A and Barrell Avenue. CMF=0.984; Advance street name signs http://www.cmfclearinghouse.org/study_detail.cfm?stid=164	$	Medium
E-3	Consider modification to the location, size, and height of the stop sign on Avenue A and Barrell Avenue.	$	Medium
E-4	Striping showing the edge of the travel-way on Barrell Avenue and Avenue A would better convey a safe location to stop.	$	Medium/High

	Medium Term	Cost	Safety Benefit
E-5	Installation of retro-reflective pavement markings would significantly increase visibility.	$$	High
E-6	Investigate street name signage, and install oversized street names signs to allow for better way-finding. CMF=0.984; Advance street name signs http://www.cmfclearinghouse.org/study_detail.cfm?stid=164	$$	Medium/High

	Long Term	Cost	Safety Benefit
E-7	Conduct a corridor lighting study, and consider the lighting needs of both vehicles and pedestrians, and emphasize the intersections and pedestrian crossing sites (both marked and known unmarked crossings). CMF=0.881; A Framework for Estimating the Safety Effects of Roadway Lighting at Intersections http://www.cmfclearinghouse.org/study_detail.cfm?stid=163 CMF=0.39; Illumination http://www.cmfclearinghouse.org/study_detail.cfm?stid=14	$$	Medium/High
E-8	Consider relocating the guide rail away from the edge of pavement in order to improve sight distance and in conjunction with the construction of sidewalks.	$$$	High
E-9	A sign study should be conducted by professional engineering staff to upgrade the signage and add needed signs throughout the corridor.	$$	Medium/High

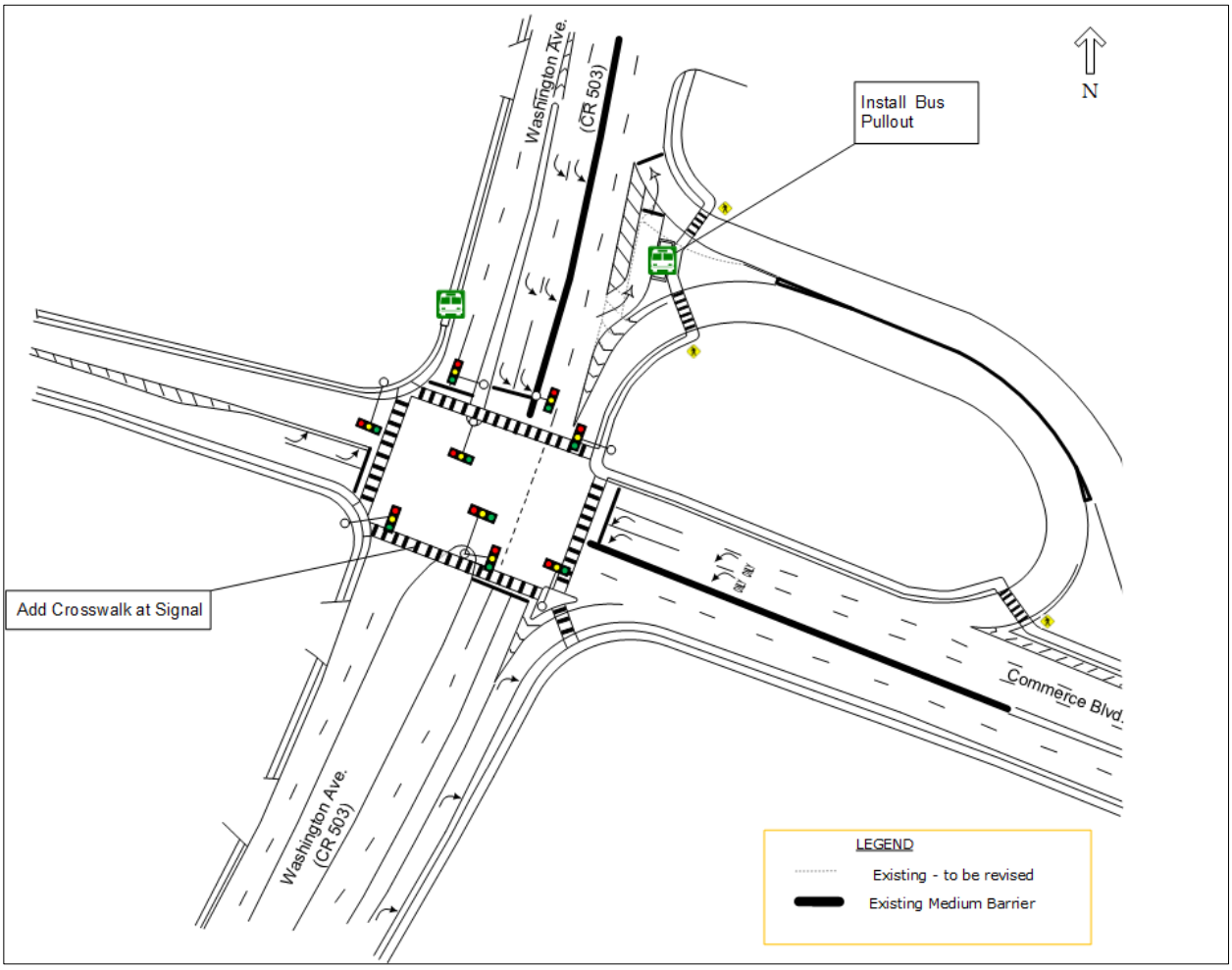
	Concerns Addressed:
7	Crosswalk is missing or crosswalk striping is worn and not clearly visible.
10	Vehicles travelling from Route 120 to Washington Avenue (CR 503) fail to transition from higher speeds.
11	Significant amount of speeding throughout the project corridor.
16	Limited sight distance causes encroachment.
18	Not all of the traffic signal heads are 12-inch size.
22	The traffic signal heads have limited visibility.
23	Jughandle not consistently being utilized by northbound left-turning vehicles.
24	Restricted turning movements not properly signed.
25	Unmarked merge north of intersection.
26	Missing “No Left Turn” sign.
27	Stop sign is set back too far back from the intersection.
28	Street identification signs are lacking, not clearly visible or not standard.
31	Faded roadway markings are not clearly visible.
32	The corridor could benefit from additional lighting.

F – Improve Safety for Bus Passengers

	Short Term	Cost	Safety Benefit
F-1	Consider the relocation of the northbound bus stop at Veterans Boulevard. Potential locations may include (1) Slip-Ramp Island, or (2) diversion using jughandle onto Jomike Court.	$	Medium/High
F-2	A study of each bus stop should be conducted to determine if a better and safer location exists along the existing roadway. Considerations should include proximity to crosswalks and pedestrian facilities, especially at Barrell Avenue.	$	Medium/High
	CMF=0.55; Presence of far-side transit stop location (transit-related crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=112		
	CMF=1.38; Presence of near-side transit stop location (transit-related crashes) http://www.cmfclearinghouse.org/study_detail.cfm?stid=112		
F-3	Relocate bus stop to an alternate location so the stopped bus does not block sight-distance for Barrell Avenue traffic.	$	High

	Long Term	Cost	Safety Benefit
F-4	Construct bus turnouts, corridorwide, to provide a safe area outside of a live-lane for the bus to load/unload passengers. [See diagram below]	$$$	High
F-5	Consider installation of pedestrian access to existing northbound bus stop at Commerce Boulevard. [See diagram below]	$$	Medium/High

	Concerns Addressed:
8	Locations of bus stops do not provide safe areas for passengers to wait for and alight from bus.
9	Bus stop adjacent guide rail located at edge of travel lane puts passenger in way of live traffic.



Installing a bus stop in the area between the ramps and northbound Washington Avenue (CR 503) would provide safety for pedestrians accessing the bus stops and northbound vehicles.

G – Design Roadway Environment for Desired Operating Speeds

	Short Term	Cost	Safety Benefit
G-1	Consider the installation of additional speed limit signs.	$	Medium
G-2	Consider providing advance notice to northbound vehicles transitioning from the high-speed roadway of NJ 120 to reduced speed on Washington Avenue (CR 503).	$	Medium
G-3	Consider transverse rumble strips, and/or optical speed reduction markings (west of Road A).	$$	Medium/High
G-4	Consider modifications of the cross-section, including narrowing of the inner-lane to 11 feet. The needs of trucks need to be considered and weighed against the potential reduction in speed-related crashes.	$	Medium

	Medium Term	Cost	Safety Benefit
G-5	Consider utilizing "Your Speed" signage at some locations (west of Road A).	$$	Medium/High
	CMF=0.56; Install changeable speed warning signs for individual drivers http://www.cmfclearinghouse.org/study_detail.cfm?stid=14		

	Concerns Addressed:
10	Vehicles travelling from Route 120 to Washington Avenue (CR 503) fail to transition from higher speeds.
11	Significant amount of speeding throughout the project corridor.

H – Maintenance

	Short Term	Cost	Safety Benefit
H-1	Regular maintenance should keep the roadway markings clearly visible to pedestrians and vehicles. CMF=0.55; Install edge lines, centerlines, and post-mounted delineators http://www.cmfclearinghouse.org/study_detail.cfm?stid=14	$	Medium/High
H-2	Regular maintenance of cleaning out silted inlets will help alleviate drainage issues.	$	Medium
H-3	Consider replacing the "No Left Turn" sign from Barrell Avenue.	$	Medium/High
H-4	Revise the location of the stop sign on Avenue A, in conformance with the MUTCD. CMF=0.85; Install signs to conform to MUTCD http://www.cmfclearinghouse.org/study_detail.cfm?stid=14	$	Medium

	Long Term	Cost	Safety Benefit
H-5	Consider revising the geometry to increase the radius and better accommodate wide turning tractor trailers; this should reduce maintenance costs to fix the curb damage.	$$+	Medium/Low

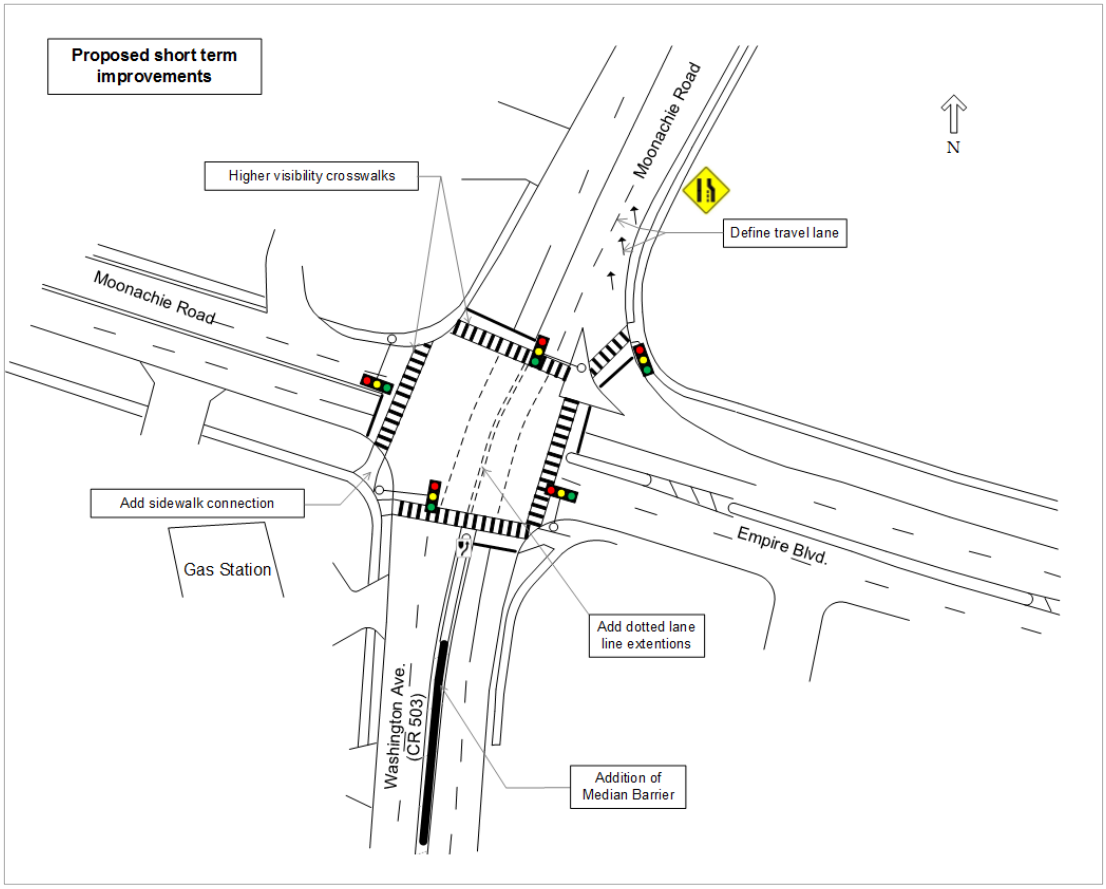
	Concerns Addressed:
7	Crosswalk is missing or crosswalk striping is worn and not clearly visible.
17	Trucks frequently impact curb due to tight radius.
26	Not all of the traffic signal heads are 12-inch size.
27	Stop sign is set too far back from the intersection.
31	Faded roadway markings are not clearly visible.
33	There are numerous ponding issues especially on Washington Avenue (CR 503) southbound, adjacent to gas station exit.

Proposed Intersection Concepts

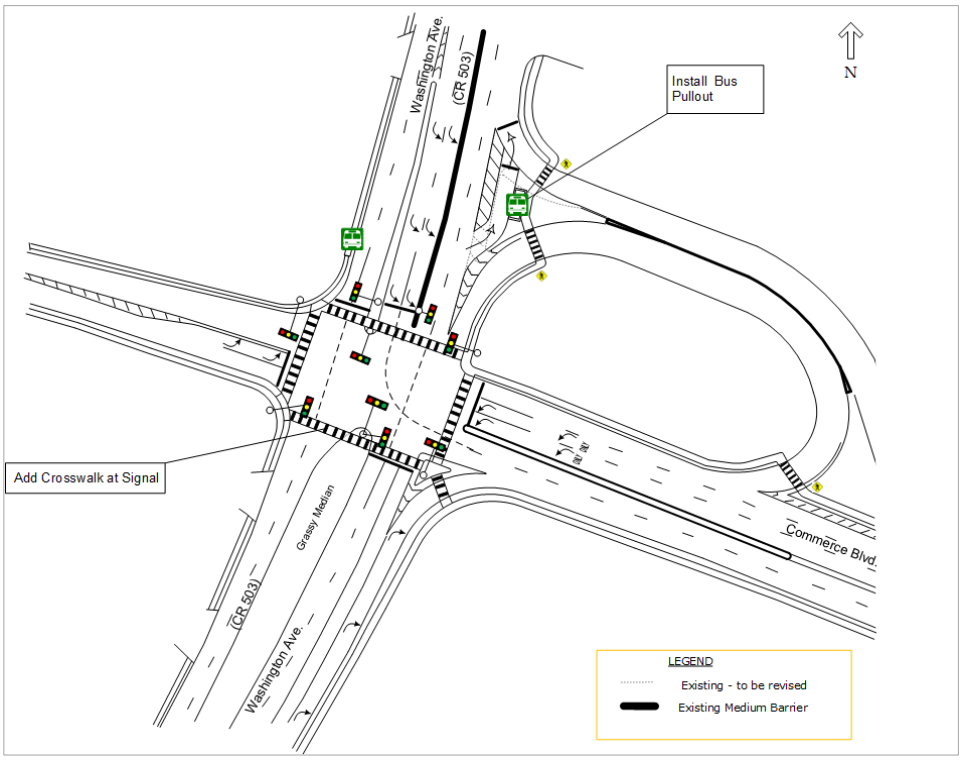
The following diagrams provide a visual representation of some of the recommendations included in this report. They are not inclusive of all the suggestions and are only one approach to improving safety at these locations. They should serve as a starting point in the discussions of how to create a safer environment for all the roadway users.

In Appendix D, the diagrams appear again in full size.

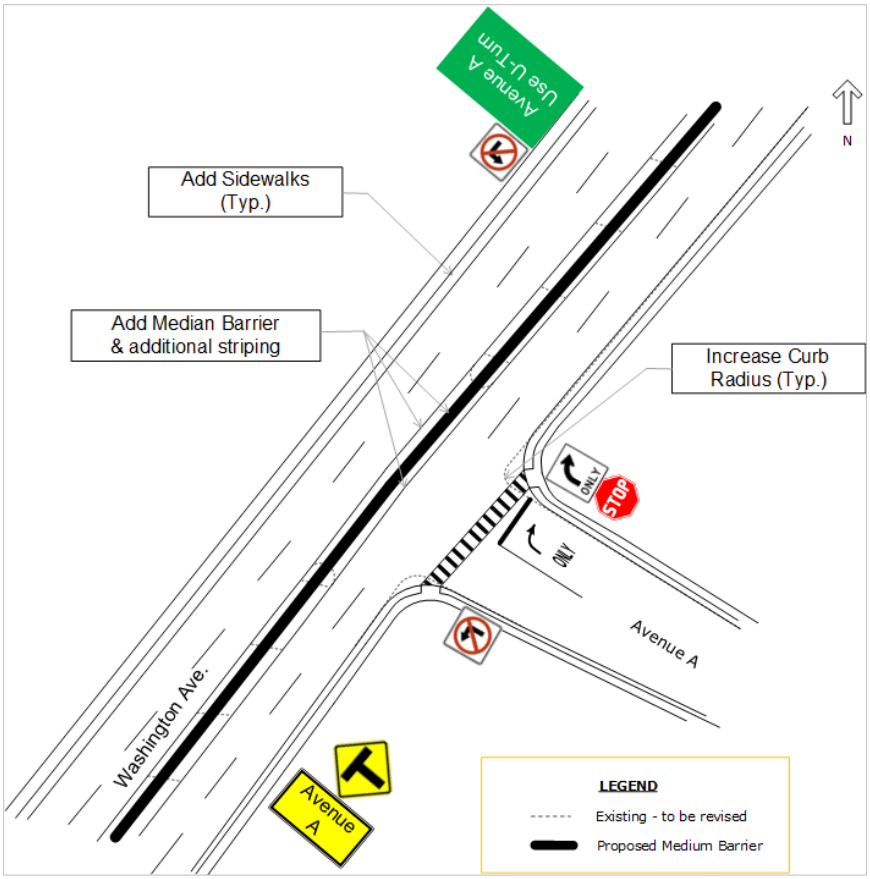
Proposed Short-Term Improvements to
Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)



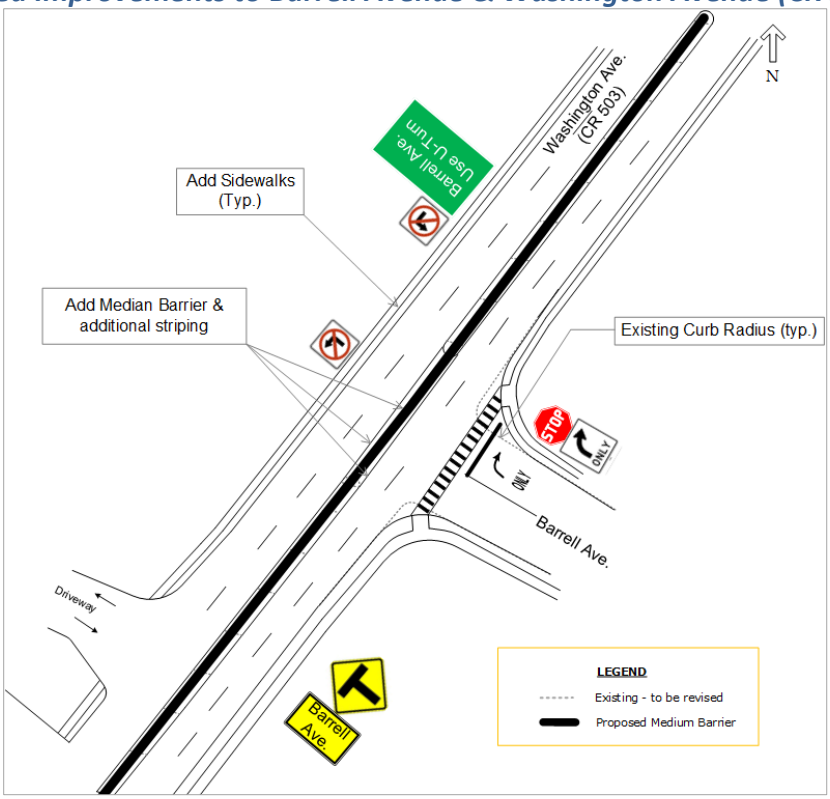
Proposed Improvements to Commerce Boulevard & Washington Avenue (CR 503)



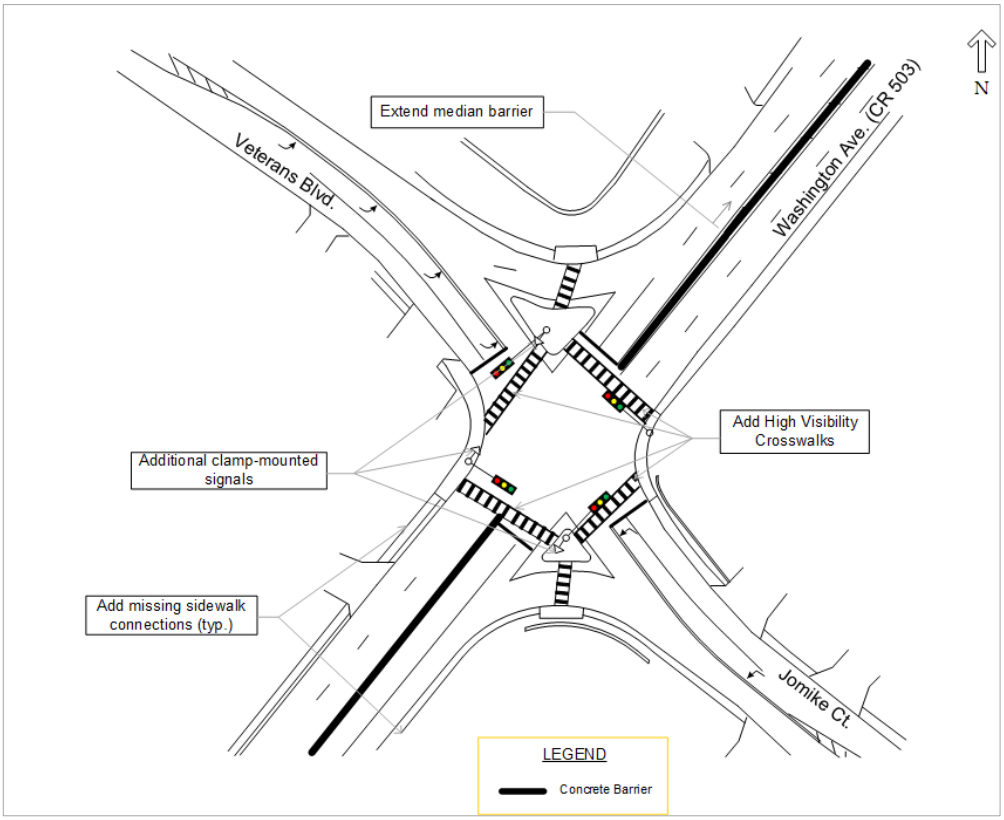
Proposed Improvements to Avenue A & Washington Avenue (CR 503)



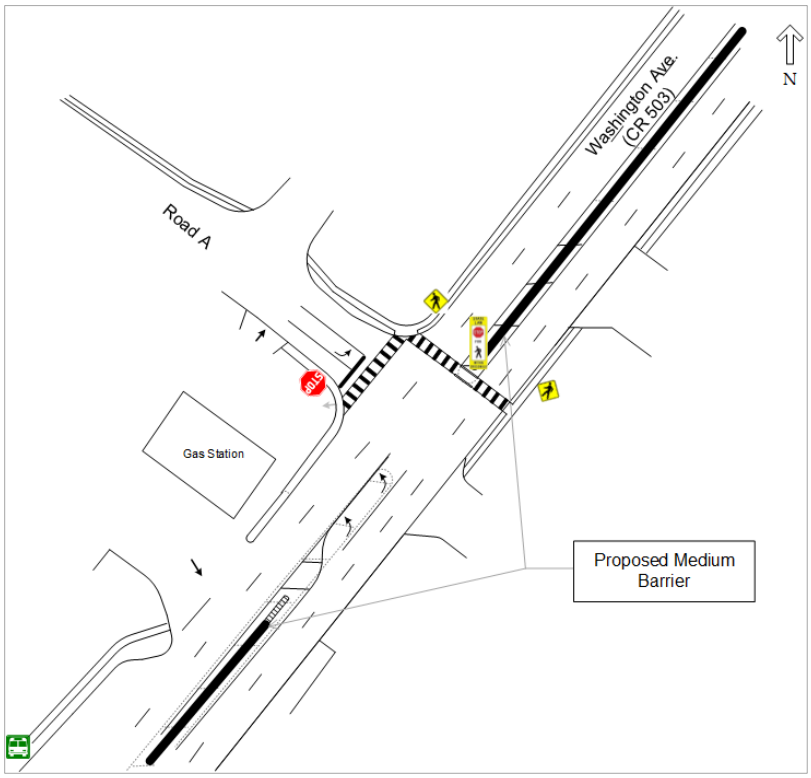
Proposed Improvements to Barrell Avenue & Washington Avenue (CR 503)



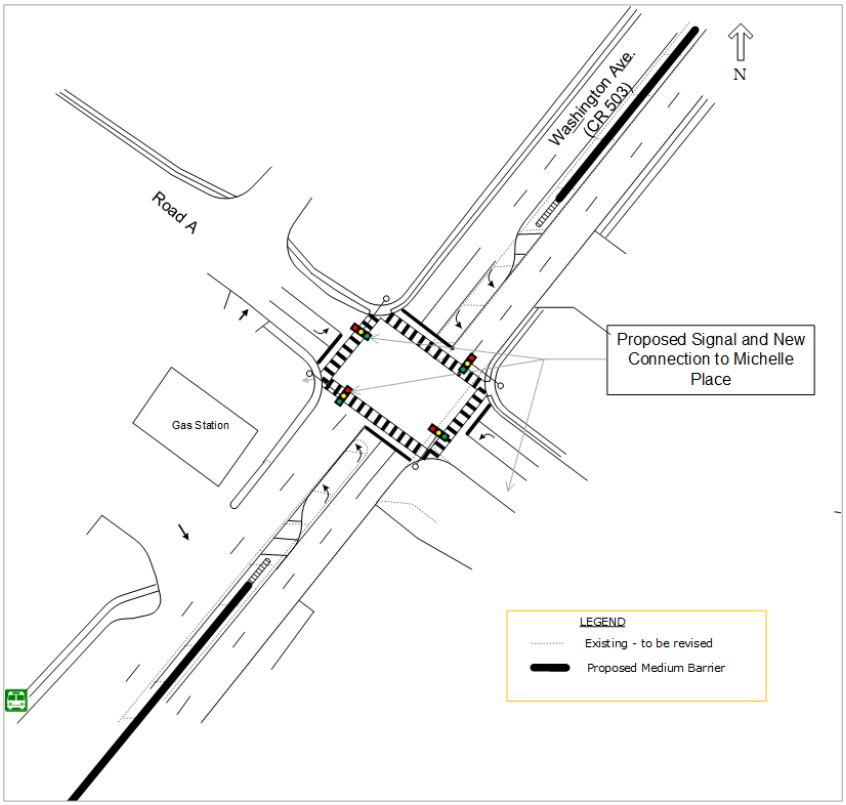
Proposed Improvements to Veterans Boulevard & Washington Avenue (CR 503)



Proposed Short-Term Improvements to Road A & Washington Avenue (CR 503)



Proposed Long-term Improvements to Road A & Washington Avenue (CR 503)



Implementing Recommendations

The RSA Team's recommendations suggested in this report should improve the safety of the six intersections along the Washington Avenue (CR 503) corridor between Route 120 and Moonachie Road/Empire Boulevard (CR 36) in the Carlstadt Borough. Most of the recommendations fall under Bergen County roadway jurisdiction.

Many of the recommendations contained within this report can be implemented through routine maintenance, such as maintaining signs, pavement conditions, and roadway markings, while others will take more time and investment. Recognizing limited resources and developing partnerships can help to extend the impact of safety efforts. Rutgers' TSRC can provide support to municipalities and counties in identifying partnership opportunities. North Jersey Transportation Planning Authority (NJTPA) staff also provides a great partnership to assist with analysis with respect to crash data, capacity analysis, or any other related assistance.

Some of the recommendations may require sizable capital investment to obtain a long-term safety benefit. It is understood that larger projects may require funding assistance from non-county and non-municipal funds. In the section following the summary of recommendations, various potential funding sources are listed.

In addition to physical improvements, a combined effort of public education and police enforcement is necessary to make these intersections a safer place for all its users.

In terms of public education, the North Jersey Transportation Planning Authority (NJTPA) provides support through various programs focused on seat belt usage, child seats, and additional driver behavior educational and outreach programs. Education about traffic safety for the employees within the area businesses, distributing informational pamphlets to pedestrians, and education about traffic safety in public schools are just a sample of the different educational campaigns that can benefit road users.

Enforcement—in areas such as prohibited turning movements, excessive speed, and pedestrian right-of-way—can go a long way in reducing crashes and alerting drivers of the seriousness of being safety conscious. Officers may also hand out pamphlets during routine traffic stops to educate motorists of changes in traffic laws.

Potential Funding Sources

In this economy, budget constraints may hamper the implementation of some of these recommendations. Finding alternative funding sources is critical to ensuring the investment in the safety of the intersections' users.

Local Funding Sources:

Roadway Owner's Maintenance and Operation Budget:

Existing funds from local and county sources, as appropriate, which are allocated for investment in maintenance and operational activity, can be used to implement the above suggestions. Many of the above countermeasures may be eligible for the appropriate use of these existing funds. The manager of these funds who understands the full budget picture should be consulted.

State Funding Sources:

LOCAL AID

Contact:

NJDOT Local Aid District 2, Newark (Bergen, Essex, Hudson, Union)
153 Halsey Street – 5th floor
Newark, NJ 07102
Phone: 973-877-1500
Fax: 973-877-1556

MUNICIPAL AID/URBAN AID PROGRAM (NJDOT Local Aid):

http://www.state.nj.us/transportation/business/localaid/municaid.shtm

This program has been a significant resource for municipalities in funding local transportation projects. All municipalities are eligible. The department continues to encourage municipalities to consider using the Municipal Aid Program to fund projects such as resurfacing, rehabilitation, or reconstruction and signalization.

LOCAL AID INFRASTRUCTURE FUND (Discretionary Aid):

http://www.state.nj.us/transportation/business/localaid/descrfunding.shtm

Subject to funding appropriation, a discretionary fund is established to address emergencies and regional needs throughout the state. Any county or municipality may apply at any time. These projects are approved at the discretion of the commissioner. Payment of project costs is the same as the Municipal Aid Program. Under this program a county or municipality may also apply for funding for local pedestrian safety and bikeway projects.

SAFE STREETS TO TRANSIT:

http://www.state.nj.us/transportation/business/localaid/safe.shtm

This program provides funding to counties and municipalities in improving access to transit facilities and all nodes of public transportation. The objectives of the SSTT program are:

- to improve the overall safety and accessibility for mass transit riders walking to transit facilities;
- to encourage mass transit users to walk to transit stations; and
- to facilitate the implementation of projects and activities that will improve safety in the vicinity of transit facilities (approximately one-half mile for pedestrian improvements).

HIGHWAY SAFETY FUND (Safe Corridors):

The Safe Corridor grant program targets resources to segments of several highways that have a history of high crash rates. Grants are supported by fines that are doubled in designated Safe Corridors for a variety of moving violations, including speeding. FY 12 Safe Corridors funding is being allocated based on crash data, with higher amounts of funding going to areas demonstrating the greatest need for continued enhanced enforcement measures. The link to a website is still in development.

Contact:
Shukri Abuhuzeima
Supervising Engineer
NJDOT Local Aid
Phone: 609-530-4680
Email: Shukri.Abuhuzeima@dot.state.nj.us

BIKEWAY:

http://www.state.nj.us/transportation/business/localaid/bikewaysf.shtm

The NJDOT Bikeway Grant Program provides funds to counties and municipalities to promote bicycling as an alternate mode of transportation in New Jersey. A primary objective of the Bikeway Grant Program is to support the state's goal of constructing 1,000 new miles of dedicated bike paths. This program is available to every municipality and county throughout New Jersey.

TRANSIT VILLAGES:

http://www.state.nj.us/transportation/business/localaid/transitvillagef.shtm

The Transit Village Grant Program is designed to assist municipalities who have been formally designated as Transit Villages. These are municipalities that have made a commitment to grow in the area surrounding a transit facility. The facility can service commuter rail, bus, ferry, or light rail. It funds projects within a half-mile radius of major transit facilities.

Contact:
Leroy Gould
Transit Village Coordinator
Phone: 609-530-3864
Email: Leroy.gould@dot.state.nj.us

NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS

MAIN STREET NEW JERSEY

http://www.nj.gov/dca/divisions/dhcr/offices/msnj.html

Main Street New Jersey provides selected communities with technical assistance and training of proven value in revitalizing historic downtowns. The program helps municipalities improve the economy, appearance, and image of their central business districts through the organization of local citizens and resources.

Contact:
Main Street New Jersey
NJ Department of Community Affairs – Office of Smart Growth
P.O. Box 204
Trenton, NJ 08625-0204
Jef Buehler
Phone: 609-633-9769
Email: jef.buehler@dca.state.nj.us

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)

http://www.nj.gov/dca/divisions/dhcr/offices/cdbg.html

The CDBG program provides funds for economic development, housing rehabilitation, community revitalization, and public facilities designated to benefit people of low and moderate income, for the prevention or elimination of slums and blight, or to address recent local needs for which no other source of funding is available.

Contact:
New Jersey Department of Community Affairs
101 South Broad Street
PO Box 811, 5TH Floor
Trenton, NJ 08625-0800
Terry Schrider
Phone: 609-633-6283
Email: terence.schrider@dca.state.nj.us

Federal Funding Sources – via NJDOT Office of Local Aid:

Contact (see details under State Funding section):

NJDOT Local Aid District 2, Newark (Bergen, Essex, Hudson, Union)

SAFE ROUTES TO SCHOOLS (SRTS):

http://www.state.nj.us/transportation/business/localaid/srts.shtm

The Safe Routes to Schools Program (SRTS) is a federally funded program and is administered by the State Departments of Transportation. This program provides funds to substantially improve the ability of primary and middle school students to walk and bicycle to school safely.

The purposes of the program are:

- to enable and encourage children, including those with disabilities, to walk and bicycle to school;
- to make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age;
- to facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity (approximately two miles) of primary and middle schools (Grades K–8).

The program establishes two distinct types of funding opportunities: infrastructure projects (the planning, design, and construction of engineering improvements) and non-infrastructure related activities (such as education, enforcement, and encouragement programs).

Contact:
Elise M Bremer-Nei
Supervising Planner Transportation, NJDOT
Statewide Planning
Phone: 609-530-2765
Email: Elise.Bremer-Nei@dot.state.nj.us

Federal Funding Sources – via North Jersey Transportation Planning Authority (NJTPA):

Contact:

North Jersey Transportation Planning Authority
One Newark Center, 17th Floor
Newark, NJ 07102
Phone: 973-639-8400
Fax: 973-639-1953

LOCAL SAFETY PROGRAM:

http://www.njtpa.org/Project/Devel/local_safety/default.aspx

The federally funded Local Safety Program (LSP) is a component of wider safety planning at the NJTPA, supporting construction of quick-fix, high-impact safety improvements on county and local roadway facilities in the NJTPA region. Projects supported by this program include new and upgraded traffic signals, signage, pedestrian indications, crosswalks, curb ramps, pavement markings, and other improvements to increase the safety of drivers, bicyclists, and pedestrians.

The Local Safety Program:

- typically addresses NJTPA and/or NJDOT derived high-priority crash locations on county or local roadways;
- supports quick-fix projects, backed with detailed crash data, with minimal or no environmental or cultural resource impacts (eligible for programmatic categorical exclusion from FHWA); and
- funds the construction phase of work only—planning, design, and right-of-way acquisition are the responsibility of the sponsor.

LOCAL CMAQ MOBILITY INITIATIVES:

http://www.njtpa.org/Project/Mobility/Default.aspx

The NJTPA has established the CMAQ Local Mobility Initiatives Program to promote a variety of initiatives to lessen the level of pollutants and greenhouse gases generated through the use of fossil fuels including ridesharing, transit usage, travel demand management, and traffic mitigation projects. Proposals must implement strategies and policies in the Regional Transportation Plan, Plan 2040.

THE HIGH RISK RURAL ROADS PROGRAM

http://www.njtpa.org/Project/Devel/local_safety/default.aspx

High Risk Rural Roads Program (HRRRP) provides federal funds for construction improvements to address safety problems *ONLY on roadways that are functionally classified as rural major collector, rural minor collector, or rural local roads* **and** *have a crash rate that exceeds the statewide average for those functional classes of roadways.* Projects supported by this program have included skid-resistant surface treatments, guiderails, reflective pavement markings, rumbles strips and rumble stripes, safety edge, enhanced and advanced warning signs.

This program funds the construction phase of work only, and therefore planning, design, and right-of-way acquisition are the responsibility of the sponsor

LOCAL CONCEPT DEVELOPMENT PHASE of the LOCAL CAPITAL PROJECT DELIVERY PROGRAM

http://www.njtpa.org/Project/Devel/local_capital_program/local_concept/default.aspx

The Local Capital Project Delivery Program (LCPD) provides federal funding for priority local projects. The Local Concept Development (LCD) Phase involves drafting a well-defined and well-justified purpose and need statement focusing on the primary transportation need to be addressed. The LCD Phase elements include, but are not limited to: data collection, coordination, development of a reasonable number of prudent and feasible conceptual alternatives, and investigation of all aspects of a project: environmental, right-of-way (ROW), access, utilities, design, community involvement, constructability, etc. at a "planning level of effort," and addressing requirements of the NJTPA Congestion Management Process (CMP).

SUBREGIONAL STUDIES PROGRAM

http://www.njtpa.org/Plan/Subregion/subregional_studies/default.aspx

This is a competitive program that provides two-year grants to individual sub-regions or sub-regional teams. The program is designed to assist sub-regions in refining and developing transportation improvement strategies rooted in the NJTPA's Regional Transportation Plan (RTP). Ultimately, the program aims to generate project concepts ready for further development or implementation consistent with the RTP and/or other transportation planning activities in the region.

TRANSPORTATION ALTERNATIVES PROGRAM

This is new under MAP-21 and is currently under development at the NJDOT.
http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm

The Transportation Alternatives Program (TAP) provides funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation, and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail program projects; safe routes to school projects; and projects for the planning, design, or construction of boulevards and other roadways largely in the right-of-way of former interstate system routes or other divided highways.

Federal Funding Sources – via NJDOT Department of Highway Traffic Safety:

http://www.nj.gov/oag/hts/grants/index.html

The New Jersey Division of Highway Traffic Safety offers, on an annual basis, federal grant funding to agencies that wish to undertake programs designed to reduce motor vehicle crashes, injuries, and fatalities on the roads of New Jersey. Municipal, county, state government, and law

enforcement agencies, as well as nonprofit organizations, are encouraged to apply for NJDHTS grant funding to address specific, local traffic safety issues.

Contact:

Bob Gaydosh, North Region Supervisor
(Bergen, Essex, Hudson, Morris, Passaic, Sussex, Warren)
609-633-9022
robert.gaydosh@lps.state.nj.us

Appendix A – Raw Crash Data

Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL PEDESTRIANS INVOLVED	TOTAL VEHICLES INVOLVED
2/12/2009	8:50 AM	Backing	Daylight	Property Damage	Dry	0	0	2
3/3/2009	8:14 AM	Left Turn / U-Turn	Daylight	Property Damage	Wet	0	0	2
6/18/2009	4:26 PM	Left Turn / U-Turn	Daylight	Property Damage	Wet	0	0	2
3/3/2009	7:36 AM	Right Angle	Daylight	Property Damage	Icy	0	0	2
4/7/2009	3:35 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	0	2
5/2/2009	11:07 AM	Right Angle	Daylight	Property Damage	Dry	0	0	2
8/19/2009	4:20 PM	Same Direction – Rear End	Daylight	Injury	Dry	1	0	2
9/18/2009	9:16 AM	Same Direction – Side Swipe	Daylight	Property Damage	Dry	0	0	2
10/12/2009	8:44 AM	Backing	Daylight	Property Damage	Dry	0	0	2
11/4/2009	6:30 PM	Same Direction – Side Swipe	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0	2
3/9/2010	8:46 AM	Same Direction – Rear End	Daylight	Injury	Dry	1	0	2
5/5/2010	7:39 AM	Right Angle	Daylight	Property Damage	Dry	0	0	2
1/15/2010	4:00 PM	Fixed Object	Daylight	Property Damage	Dry	0	0	1

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL PEDESTRIANS INVOLVED	TOTAL VEHICLES INVOLVED
1/27/2010	4:11 PM	Right Angle	Daylight	Property Damage	Dry	0	0	2
9/9/2010	7:53 AM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	0	2
9/22/2010	12:30 PM	Pedestrian	Daylight	Injury	Dry	1	1	1
12/12/2010	3:01 PM	Same Direction – Rear End	Daylight	Property Damage	Wet	0	0	2
2/4/2011	9:13 AM	Right Angle	Daylight	Property Damage	Snowy	0	0	2
4/5/2011	7:14 PM	Left Turn / U-Turn	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0	2
5/11/2011	12:35 PM	Same Direction – Side Swipe	Daylight	Property Damage	Dry	0	0	2
5/26/2011	8:10 PM	Right Angle	Dusk	Property Damage	Dry	0	0	2
9/6/2011	7:38 AM	Left Turn / U-Turn	Daylight	Injury	Wet	2	0	2
9/8/2011	8:27 PM	Right Angle	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0	2
11/3/2011	1:29 PM	Right Angle	Daylight	Injury	Dry	1	0	2
11/22/2011	11:13 PM	Same Direction – Side Swipe	Dark (Street Lights On/ continuous)	Property Damage	Wet	0	0	2
11/30/2011	5:16 PM	Right Angle	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	0	2

Commerce Boulevard & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
1/20/2009	7:08 AM	Fixed Object	Daylight	Property Damage	Icy	0	1
6/29/2009	5:25 PM	Same Direction – Rear End	Daylight	Injury	Dry	1	2
11/9/2009	10:14 AM	Right Angle	Daylight	Injury	Dry	1	2
2/14/2010	3:49 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
4/14/2010	1:14 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
11/9/2010	9:34 AM	Backing	Daylight	Property Damage	Dry	0	2
5/1/2011	1:42 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
5/25/2011	2:49 PM	Right Angle	Daylight	Property Damage	Dry	0	2
5/27/2011	7:46 AM	Non-fixed Object	Daylight	Property Damage	Dry	0	2
6/15/2011	5:57 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
6/27/2011	8:58 AM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
10/8/2011	1:04 PM	Same Direction – Rear End	Daylight	Injury	Dry	2	2
11/9/2011	12:41 PM	Same Direction – Rear End	Daylight	Injury	Dry	1	2
12/16/2011	12:11 PM	Same Direction – Side Swipe	Daylight	Property Damage	Dry	0	2

Avenue A & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
1/15/2009	12:04 PM	Right Angle	Daylight	Property Damage	Wet	0	2
11/25/2009	8:34 AM	Right Angle	Daylight	Property Damage	Dry	0	2
2/9/2010	11:34 AM	Right Angle	Daylight	Injury	Dry	1	2
11/25/2010	3:02 PM	Same Direction – Side Swipe	Daylight	Injury	Wet	3	2
2/5/2011	3:58 PM	Same Direction – Side Swipe	Daylight	Injury	Wet	3	2

Barrell Avenue & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
1/6/2009	7:30 AM	Right Angle	Daylight	Property Damage	Dry	0	2
3/11/2009	3:33 PM	Opposite Direction – Head On/Angular	Daylight	Property Damage	Wet	0	2
4/24/2009	8:40 AM	Right Angle	Daylight	Property Damage	Dry	0	2
5/19/2009	7:23 AM	Left Turn / U-Turn	Daylight	Injury	Dry	4	3
6/18/2009	12:14 PM	Right Angle	Daylight	Injury	Wet	1	2
10/28/2009	7:57 PM	Right Angle	Dark (Street Lights On/ continuous)	Property Damage	Wet	0	2
4/12/2010	4:24 PM	Right Angle	Daylight	Injury	Dry	2	2
9/14/2010	5:29 PM	Right Angle	Daylight	Injury	Dry	2	2
11/8/2010	8:00 AM	Same Direction – Side Swipe	Daylight	Property Damage	Dry	0	2

Veterans Boulevard & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
2/4/2009	7:41 AM	Fixed Object	Daylight	Property Damage	Icy	0	1
2/4/2009	7:59 AM	Same Direction – Side Swipe	Daylight	Property Damage	Icy	0	2
4/22/2009	3:18 PM	Same Direction – Rear End	Daylight	Injury	Wet	3	2
6/8/2009	8:06 AM	Opposite Direction – Side Swipe	Daylight	Property Damage	Dry	0	2
10/8/2009	11:39 AM	Same Direction – Rear End	Daylight	Injury	Dry	1	2
12/9/2009	3:00 PM	Same Direction – Rear End	Daylight	Property Damage	Wet	0	2
1/29/2010	3:45 PM	Right Angle	Daylight	Property Damage	Dry	0	2
3/26/2010	10:29 AM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
3/26/2010	4:53 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
4/20/2010	10:08 AM	Same Direction – Rear End	Daylight	Injury	Dry	2	2
7/27/2010	8:38 AM	Fixed Object	Daylight	Property Damage	Dry	0	1
9/1/2010	4:04 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
11/30/2010	2:42 PM	Right Angle	Daylight	Property Damage	Wet	0	2
2/9/2010	12:58 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2

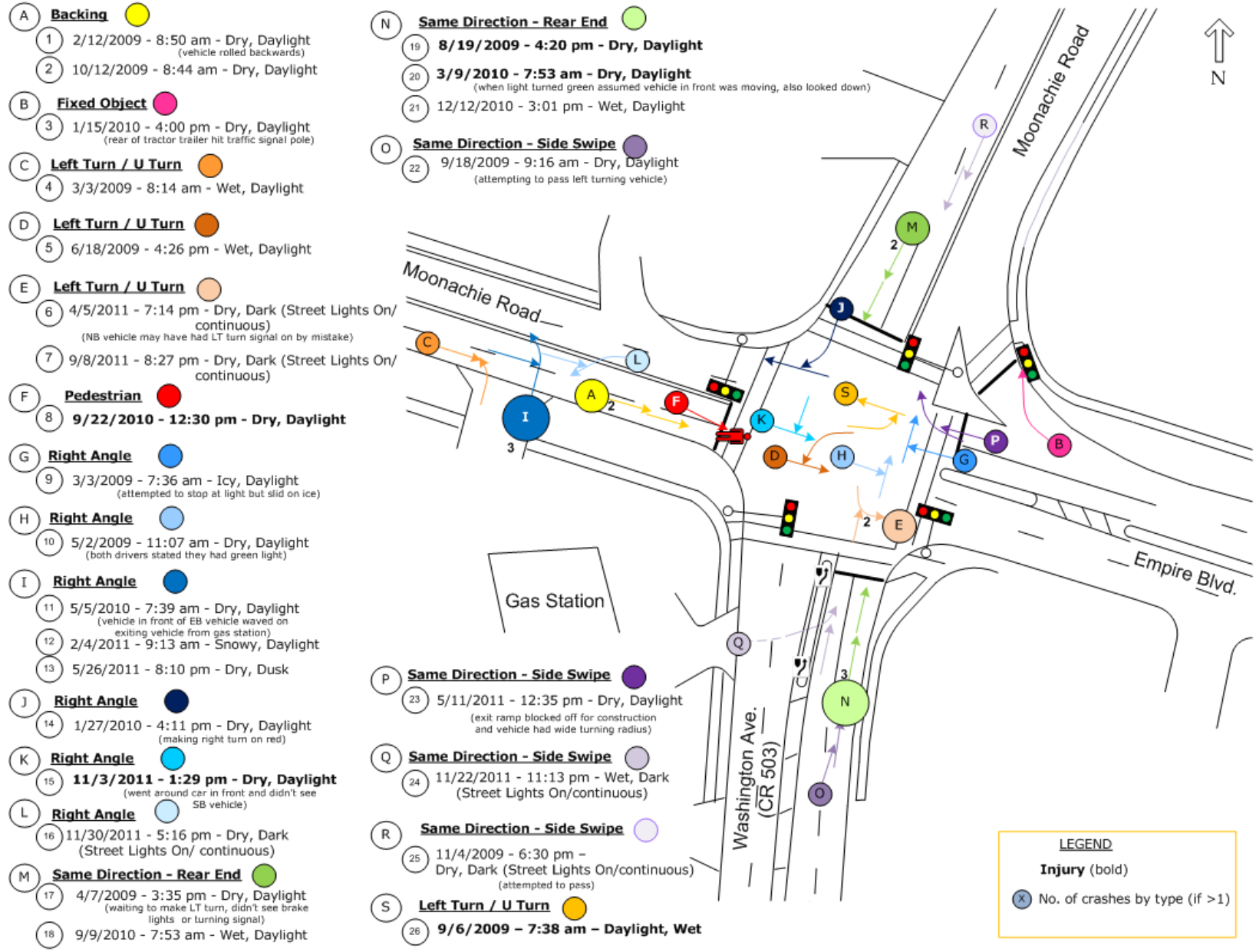
CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
9/8/2010	6:25 PM	Same Direction – Rear End	Daylight	Property Damage	Dry	0	2
2/8/2011	5:57 PM	Same Direction – Rear End	Dark (Street Lights On/ continuous)	Injury	Dry	2	2
9/6/2011	7:03 AM	Same Direction – Rear End	Daylight	Property Damage	Wet	0	2
10/2/2011	2:35 AM	Fixed Object	Dark (Street Lights On/ continuous)	Injury	Wet	4	2
12/5/2011	8:57 AM	Right Angle	Daylight	Injury	Wet	1	2

Road A & Washington Avenue (CR 503)

CRASH DATE	CRASH TIME	CRASH TYPE	LIGHT CONDITION	SEVERITY	SURFACE CONDITION	TOTAL INJURED	TOTAL VEHICLES INVOLVED
1/20/2009	3:50 PM	Right Angle	Daylight	Injury	Dry	1	2
3/28/2009	7:05 AM	Right Angle	Daylight	Injury	Wet	1	2
5/5/2009	9:29 PM	Same Direction – Rear End	Dark (Street Lights On/ continuous)	Property Damage	Wet	0	2
6/4/2009	9:17 AM	Right Angle	Daylight	Property Damage	Wet	0	2
7/9/2009	12:05 PM	Right Angle	Daylight	Property Damage	Dry	0	2
7/30/2009	2:57 PM	Same Direction – Side Swipe	Daylight	Injury	Dry	2	2
8/12/2009	5:27 PM	Right Angle	Daylight	Injury	Dry	1	2
2/2/2010	9:27 PM	Right Angle	Dark (Street Lights On/ continuous)	Property Damage	Snowy	0	2
1/6/2011	7:33 PM	Left Turn / U-Turn	Dark (Street Lights On/ continuous)	Property Damage	Dry	0	2
1/20/2011	4:17 PM	Same Direction – Side Swipe	Daylight	Property Damage	Dry	0	2
8/11/2011	8:20 AM	Backing	Daylight	Property Damage	Dry	0	2
10/9/2011	2:22 AM	Same Direction – Side Swipe	Dark (Street Lights On/ continuous)	Injury	Dry	1	2

Appendix B – Crash Diagrams

Moonachie Road/Empire Boulevard (CR 36) & Washington Avenue (CR 503)



Commerce Boulevard & Washington Avenue (CR 503)

A **Backing**
1 11/9/2010 – 9:34 am - Dry, Daylight
(stopped in middle of crosswalk and backed up)

B **Fixed Object**
2 1/20/2009 - 7:08 am - Icy, Daylight
(slid on icy surface)

C **Non-fixed Object**
3 5/27/2011 - 7:46 am - Dry, Daylight
(vehicle's right front tire came off and struck parked vehicle)

D **Right Angle**
4 **11/9/2009 - 10:14 am - Dry, Daylight**
(NB vehicle didn't see traffic light)

E **Right Angle**
5 5/25/2011 - 2:49 pm - Dry, Daylight
(tractor trailer made wide right turn from left lane)

F **Same Direction - Rear End**
6 **6/29/2009 - 5:25 pm - Dry, Daylight**
(playing with ipod, foot slipped off pedal)

7 5/1/2011 - 1:42 pm - Dry, Daylight
(thought vehicle would go through intersection)

8 6/15/2011 - 5:57 pm - Dry, Daylight
(driver momentarily looked down)

9 6/27/2011 - 8:58 am - Dry, Daylight
(slowed for yellow light!)

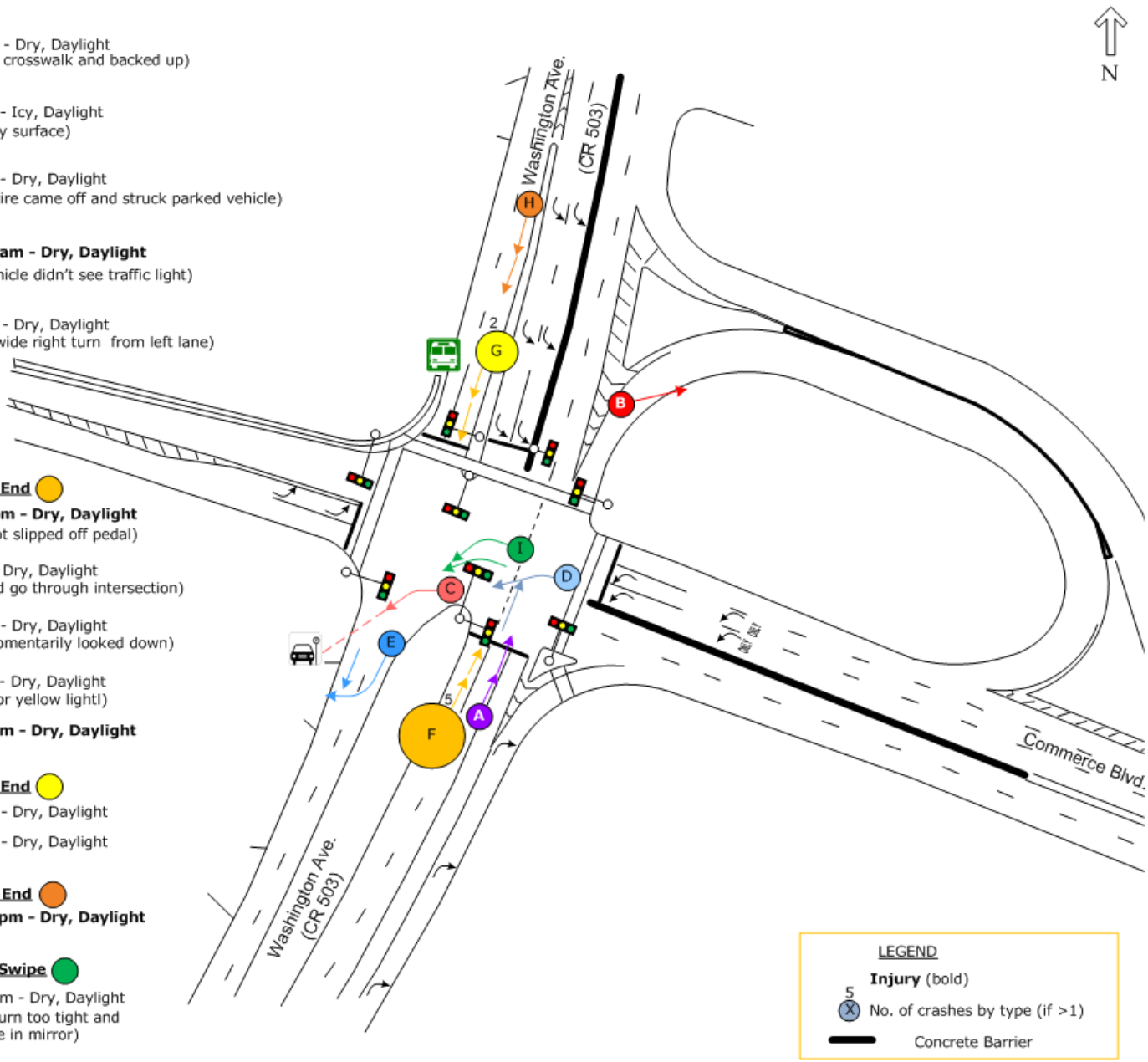
10 **10/8/2011 - 1:04 pm - Dry, Daylight**

G **Same Direction - Rear End**
11 2/14/2010 - 3:49 pm - Dry, Daylight

12 4/14/2010 - 1:14 pm - Dry, Daylight

H **Same Direction - Rear End**
13 **11/9/2011 - 12:41 pm - Dry, Daylight**

I **Same Direction - Side Swipe**
14 12/16/2011 - 12:11 pm - Dry, Daylight
(tractor trailer made turn too tight and didn't see vehicle in mirror)



Avenue A & Washington Avenue (CR 503)

A **Right Angle**

1 **2/9/2010 - 11:34 am - Dry, Daylight**
(LT turning vehicle was waived on by tractor trailer waiting to turn into Ave. A)

B **Right Angle**

2 11/25/2009 - 8:34 am - Dry, Daylight

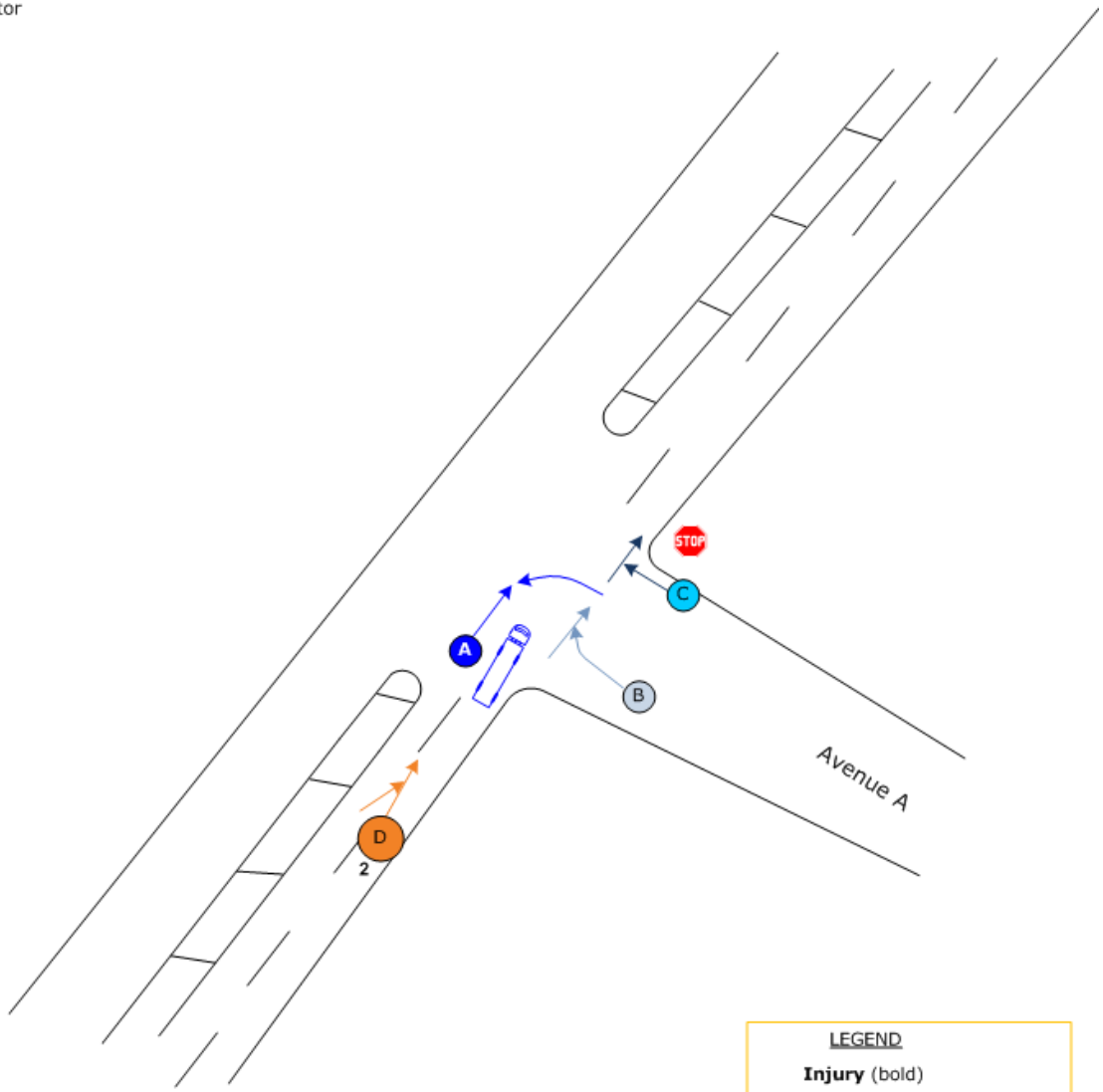
C **Right Angle**

3 1/15/2009 - 12:04 pm - Wet, Daylight
(stop sign too far back to see)

D **Same Direction - Side Swipe**

4 **2/5/2011 - 3:58 pm - Wet, Daylight**

5 **11/25/2010 - 3:02 pm - Wet, Daylight**



Barrell Avenue & Washington Avenue (CR 503)

A **Left Turn / U Turn**

1 **5/19/2009 - 7:23 am - Dry Daylight**
(crash report calls it an illegal left turn)

B **Opposite Direction - Head On/Angular**

2 3/11/2009 - 3:33 pm - Wet, Daylight
(a car in RT lane changed lanes and caused vehicle to cross median)

C **Right Angle**

3 1/6/2009 - 7:30 am - Dry, Daylight

4 **4/24/2009 - 8:40 am - Dry, Daylight**

5 10/28/2009 - 7:57 pm - Wet, Dark (Street Lights On/continuous)

6 4/12/2010 - 4:24 pm - Dry, Daylight
(bus stopped to pick up passengers blocked view of left turning vehicle)

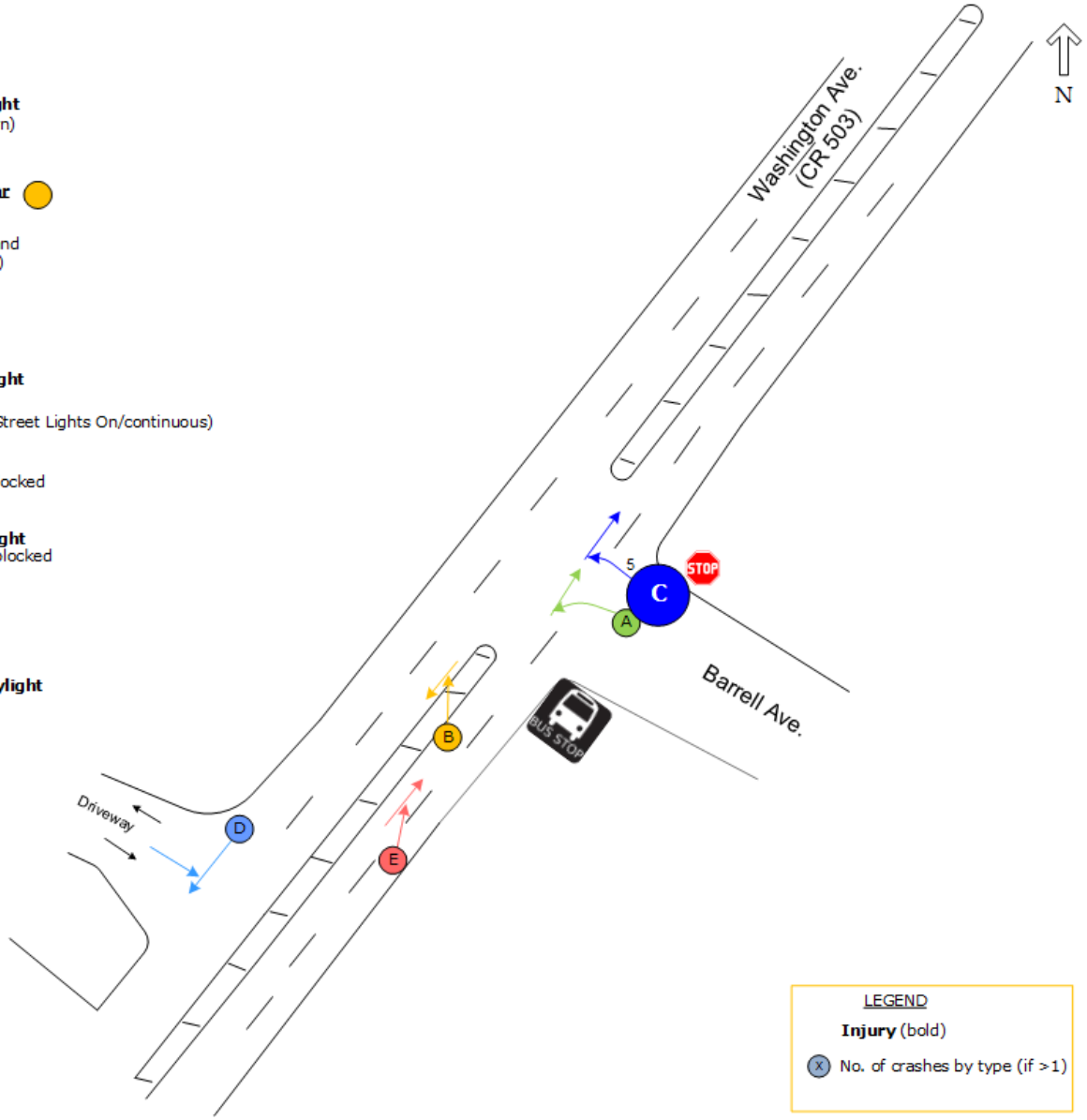
8 **9/14/2010 - 5:29 pm - Dry, Daylight**
(bus stopped to pick up passengers blocked view of left turning vehicle)

D **Right Angle**

7 **6/18/2009 - 12:14 pm - Wet, Daylight**
(didn't see SB vehicle)

E **Same Direction - Side Swipe**

9 11/8/2010 - 8:00 am - Dry, Daylight
(attempted to go around bus stopped at bus stop)



Veterans Boulevard & Washington Avenue (CR 503)

A
1 **Fixed Object**
7/27/2010 - 8:38 am - Dry, Daylight
(tire blowout, struck concrete barrier)

B
2 **Fixed Object**
10/2/2011 2:35 am - Dry, Daylight
(adjacent vehicle changed lanes and caused vehicle to swerve)

C
3 **Fixed Object**
2/4/2009 - 7:41 am - Icy, Daylight
(lost control due to icy conditions)

D
4 **Opposite Direction - Side Swipe**
6/8/2009 - 8:06 am - Dry, Daylight
(travelling in wrong direction from Veterans Blvd.)

E
Right Angle
(NB vehicles failed to obey traffic signal)
5 1/29/2010 - 3:45 pm - Dry, Daylight
6 11/30/2010 - 2:42 pm - Wet, Daylight

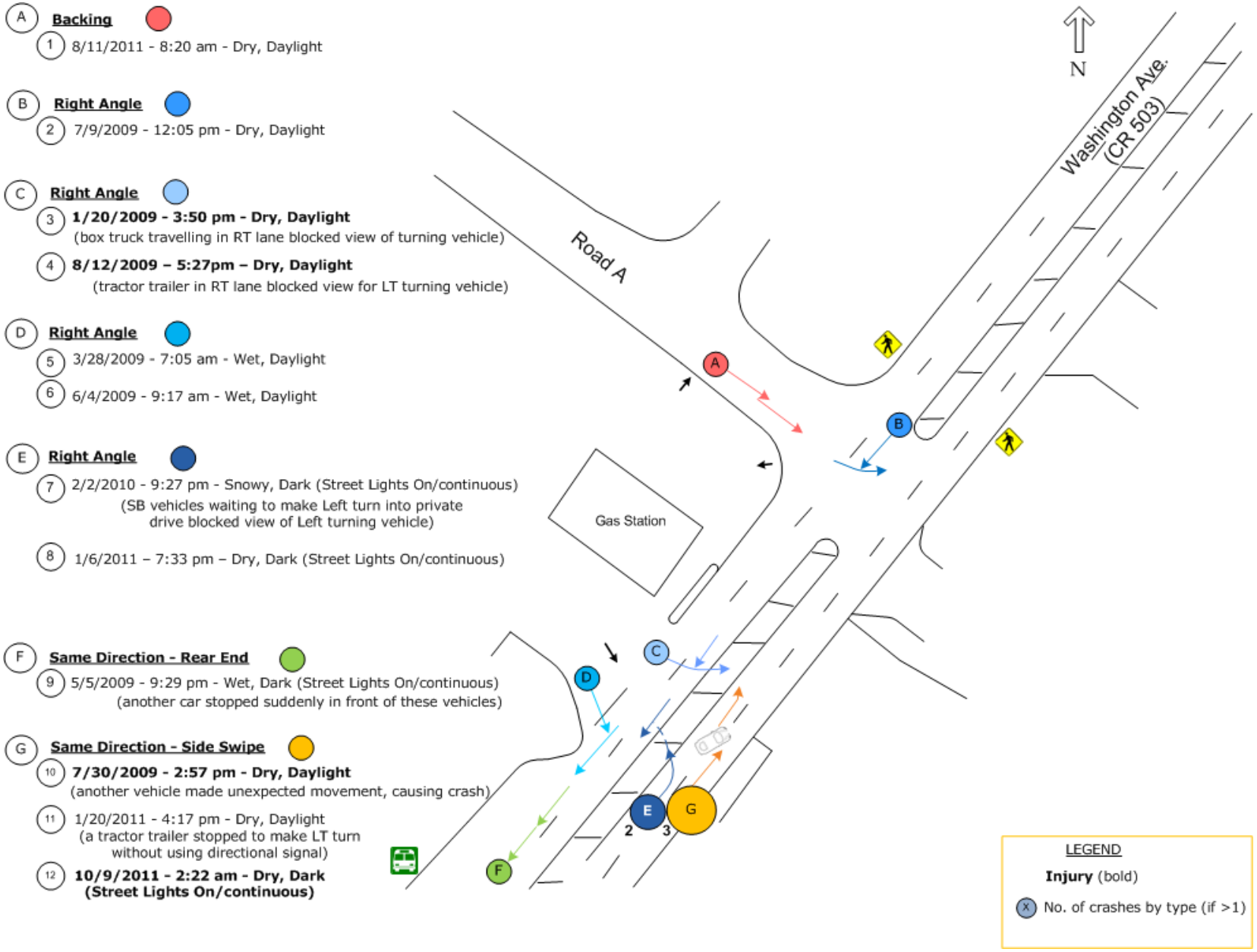
F
7 **Right Angle**
12/5/2011 - 8:57 am - Wet, Daylight
(NB vehicle failed to obey traffic signal)

G
Same Direction - Rear End
8 **10/8/2009 - 11:39 am - Dry, Daylight**
(vehicle 2 switched lanes from RT to LT)
9 3/26/2010 - 4:53 pm - Dry, Daylight
10 **4/20/2010 - 10:08 am - Dry, Daylight**
(vehicle tried to pass on right, car in the way and swerved back)
11 12/9/2010 - 12:58 pm - Dry, Daylight
12 9/6/2011 – 7:03 am - Wet, Daylight

H
Same Direction - Rear End
13 **4/22/2009 - 3:18 PM - Wet, Daylight**
14 12/9/2009 - 3:00 pm - Wet, Daylight
(wet roadway, couldn't stop in time)
15 3/26/2010 - 10:29 am - Dry, Daylight
16 9/1/2010 - 4:04 pm - Dry, Daylight
17 9/8/2010 - 6:25 pm - Dry, Daylight
18 **2/8/2011 - 5:57 pm - Dry, Dark (Street Lights On/continuous)**

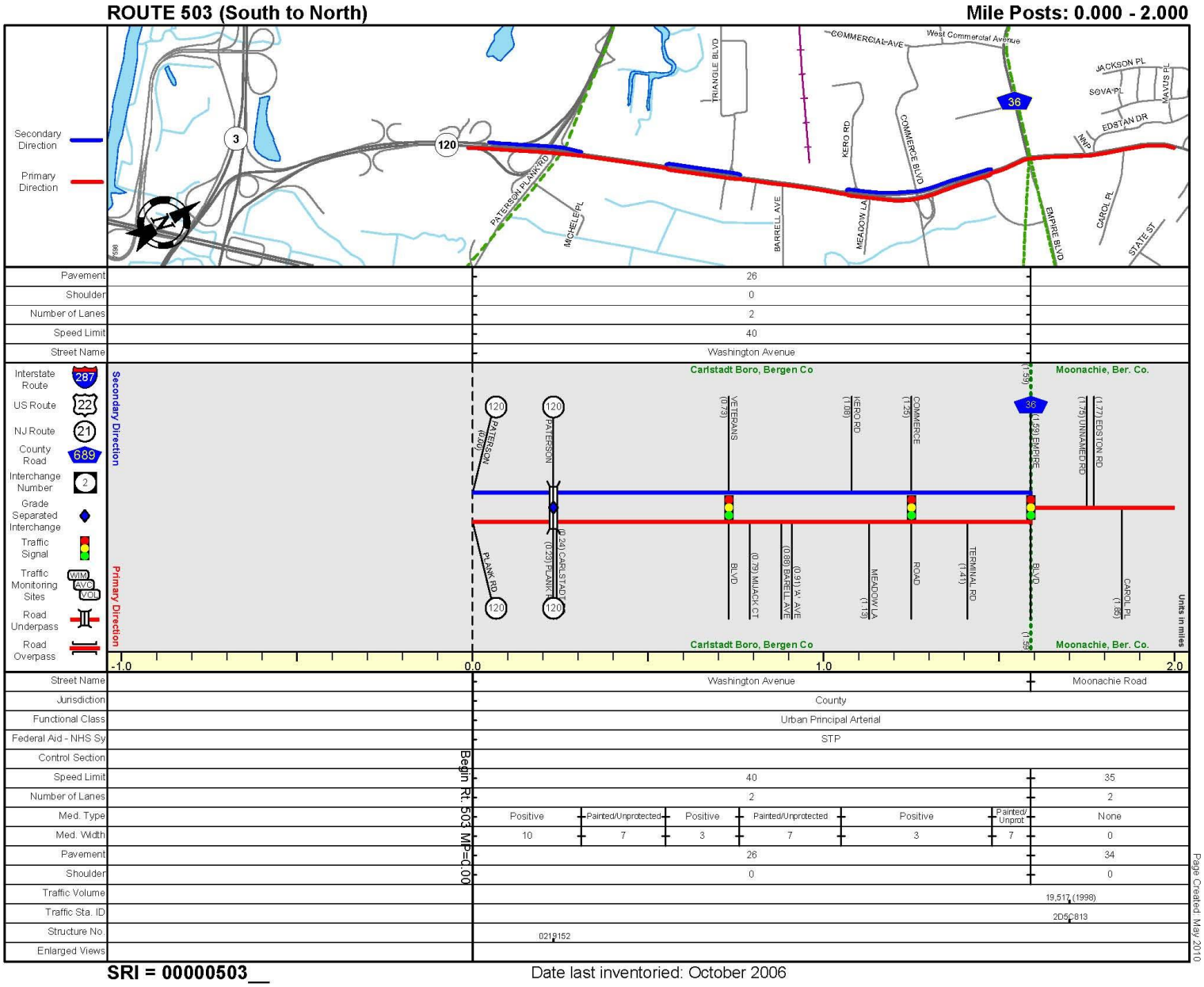
I
19 **Same Direction - Side Swipe**
2/4/2009 - 7:59 am - Icy, Daylight
(lost control due to icy conditions; hit vehicle C)

Road A & Washington Avenue (CR 503)



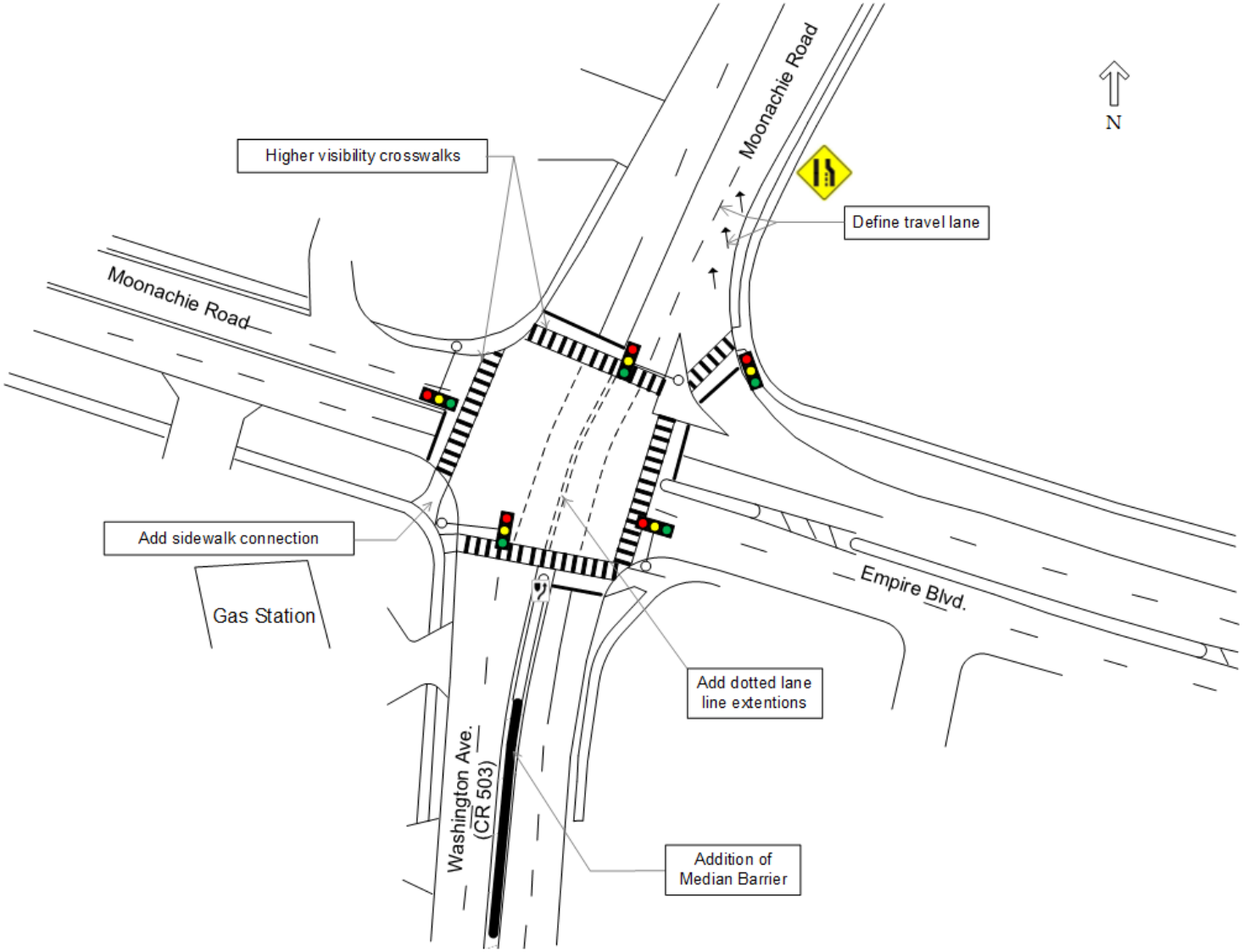
Appendix C – Straight Line Diagram

Washington Avenue (CR 503)

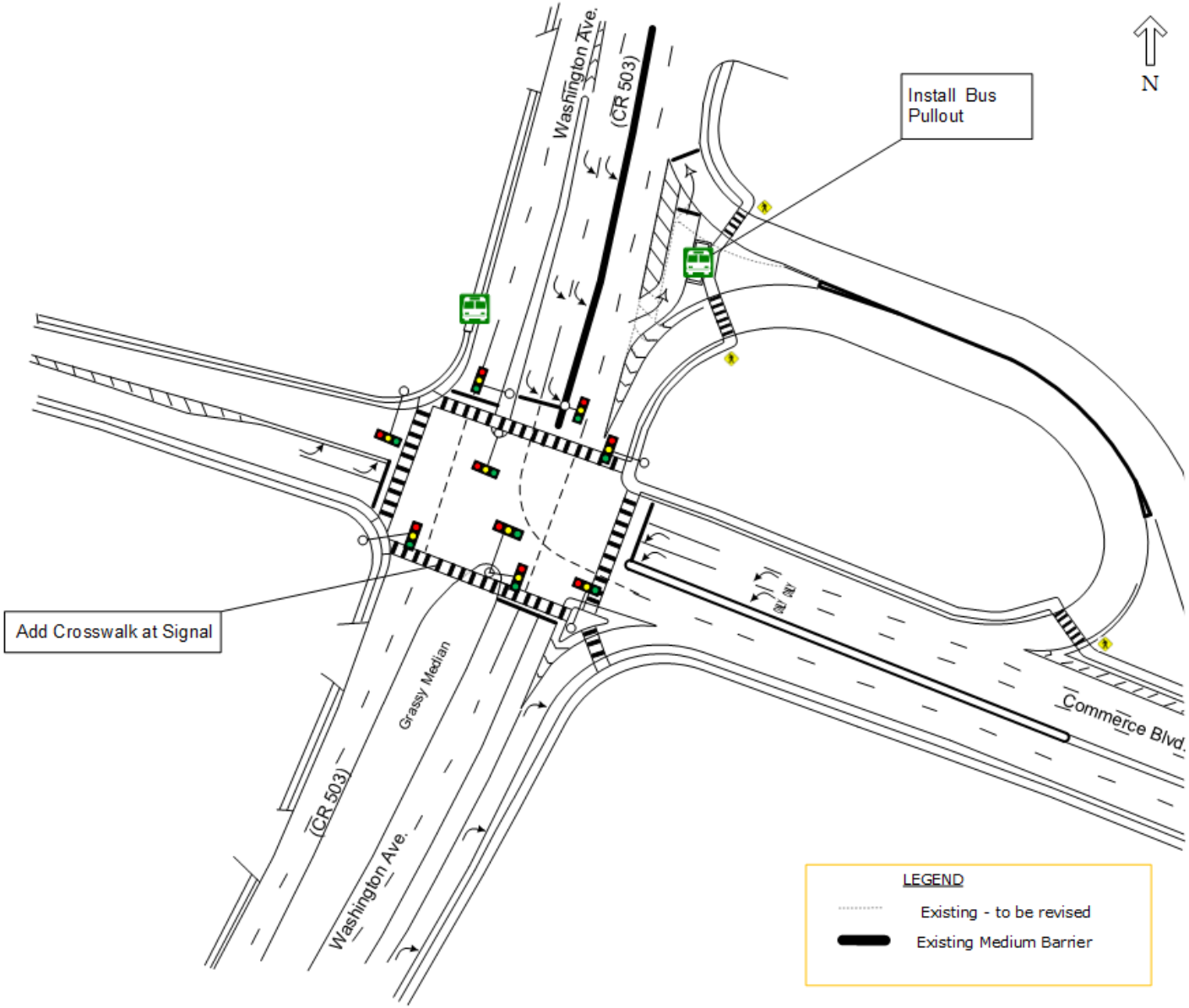


Appendix D – Diagrams

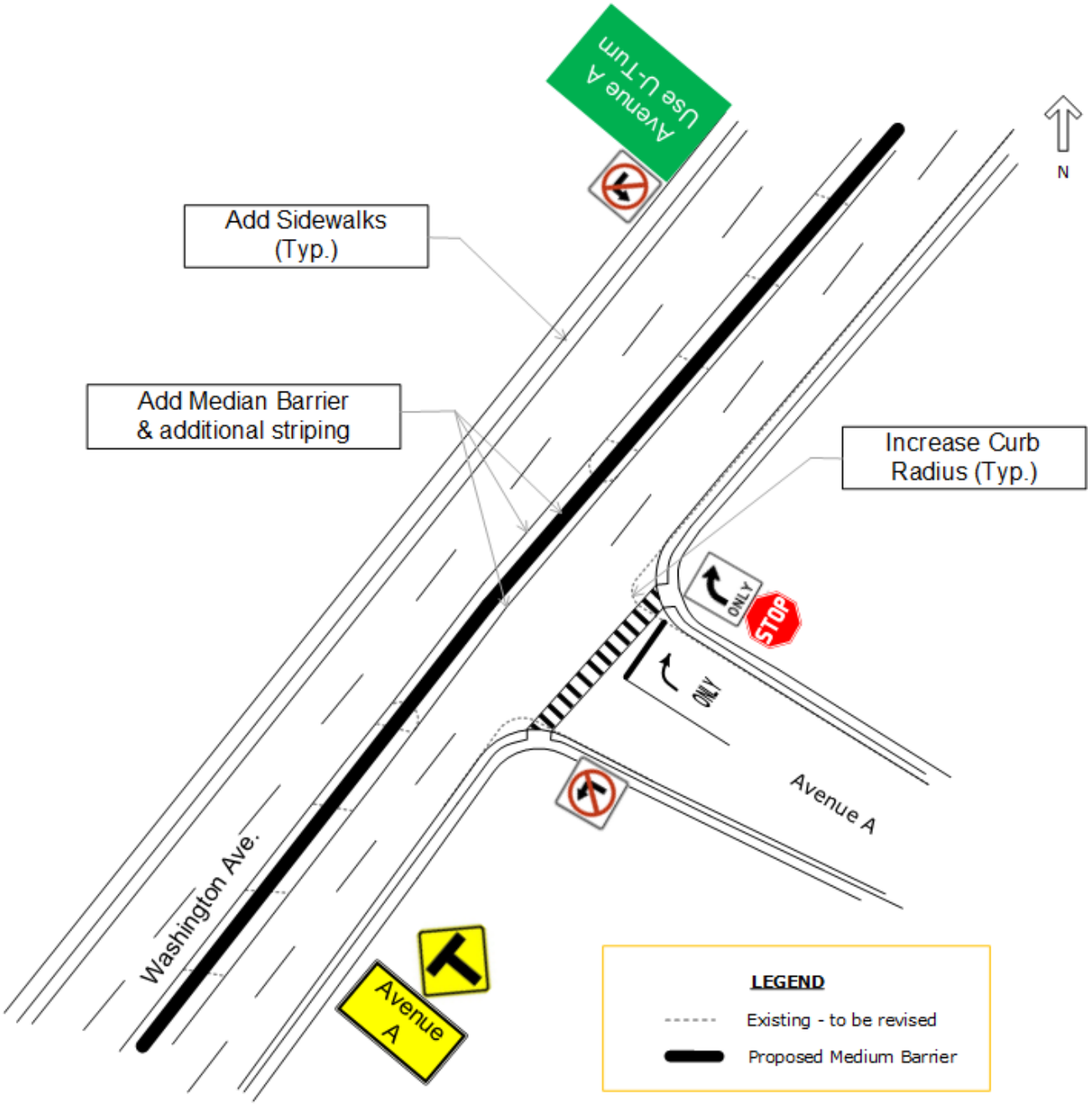
Proposed Short-term Improvements to Moonachie Road/Empire Boulevard (CR 36) &Washington Avenue (CR 503)



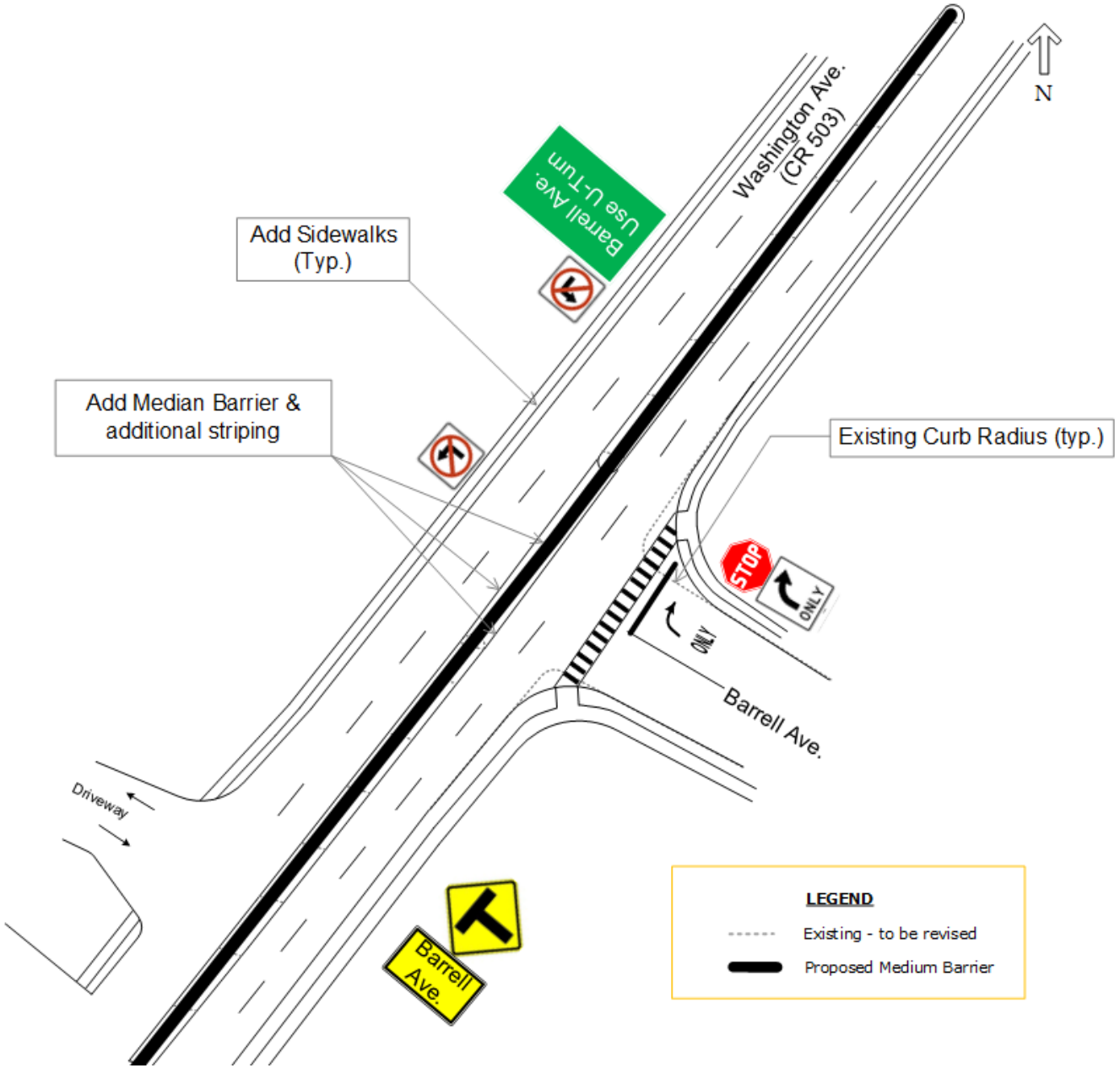
Proposed Improvements to Commerce Boulevard & Washington Avenue (CR 503)



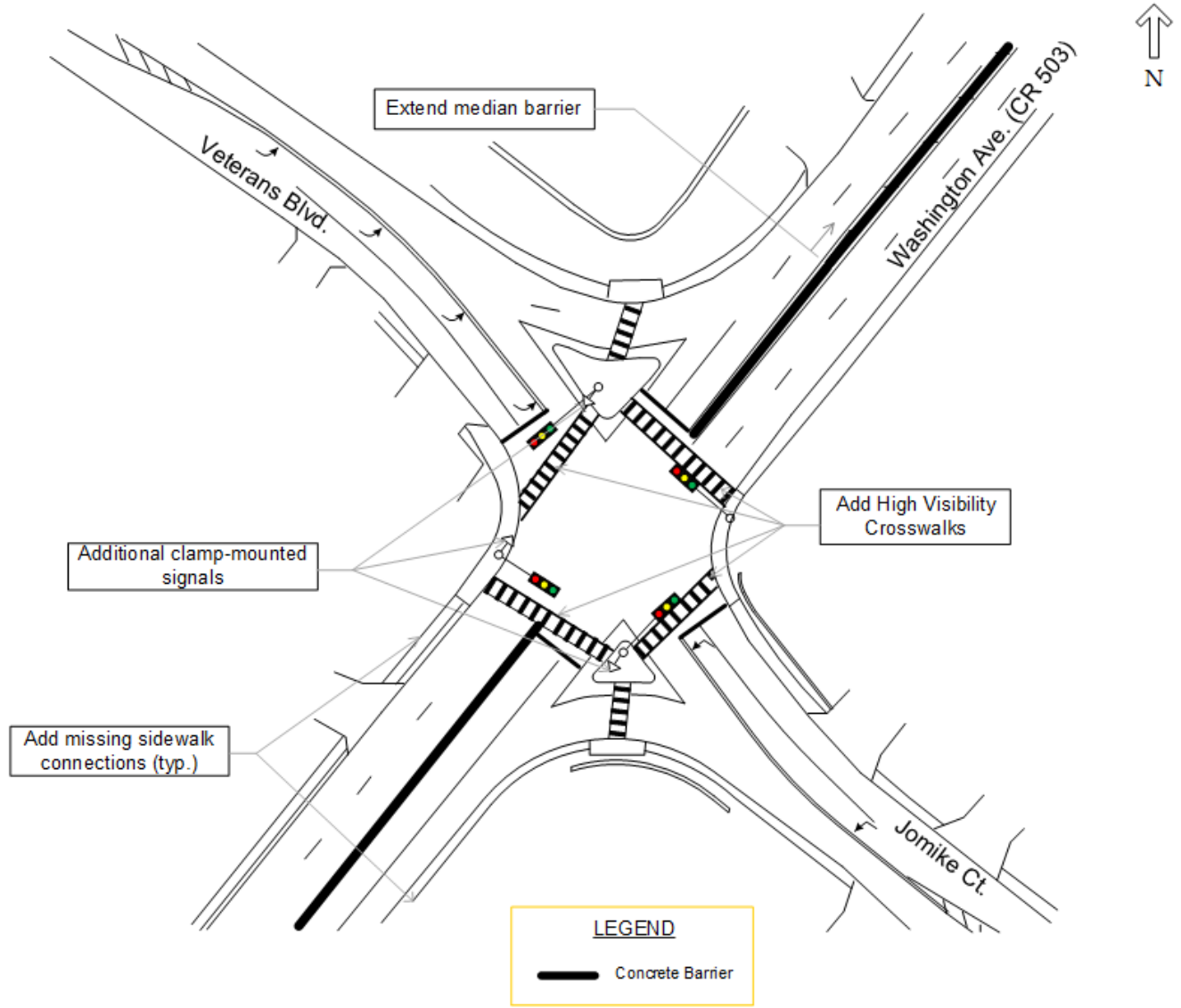
Proposed Improvements to Avenue A & Washington Avenue (CR 503)



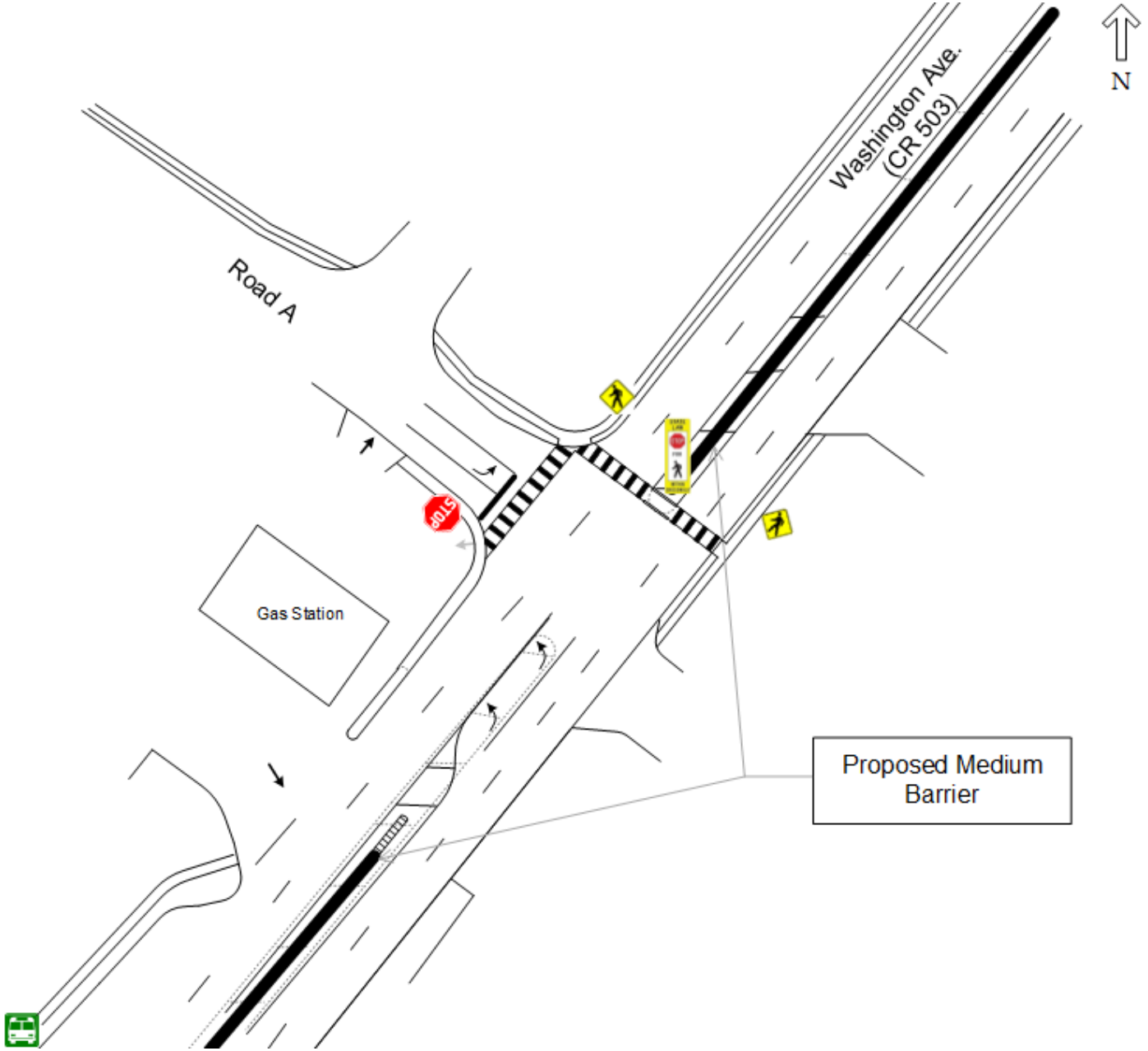
Proposed Improvements to Barrell Avenue & Washington Avenue (CR 503)



Proposed Improvements to Veterans Boulevard & Washington Avenue (CR 503)



Proposed Short-term Improvements to Road A & Washington Avenue (CR 503)



Proposed Long-term Improvements to Road A & Washington Avenue (CR 503)